Volume 39 • JULY, 1958 • No. 7

Archives of PHYSICAL MEDICINE *and* REHABILITATION

Preliminary Program Issue

ORIGINAL ARTICLES

Heidelberg Pneumatic Arm Prosthesis. Earl F. Hoerner, M.D. 411

Interpersonal Processes in a Respirator Center. Cynthia P. Deutsch, Ph.D.; Ian E. Alger, M.D.; Evelyn McNamara, M.S.; Jane Williams, M.S.; Judy F. Shor, B. S., and Joseph G. Benton, Ph.D., M.D. 417

Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration: I. Inspiration. George H. Koepke, M.D.; Edwin M. Smith, M.D.; Alma J. Murphy, Ph.D., and David G. Dickinson, M.D. 426

Influence of Arteriovenous Fistula on the Distal Circulation in the Involved Extremity. Khalil G. Wakim, M.D., and Joseph M. Janes, M.D. 431

Use of Miniature Furniture in Aphasia Retraining. Joshua Ehrlich, M.D., and Jeanne C. Cook, M.A. 435

American Academy of Physical Medicine and Rehabilitation: Notice of Amendments to By-Laws. 440

Preliminary Program — Twentieth Assembly: American Academy of Physical Medicine and Rehabilitation 445

Proposed Principles of Practice of the American Congress of Physical Medicine and Rehabilitation 446

Preliminary Program — Thirty-Sixth Annual Scientific and Clinical Session: American Congress of Physical Medicine and Rehabilitation 447

Editor of the Month
OSCAR O. SELKE, JR., M.D.
Houston

ANNUAL SESSION • PHILADELPHIA • AUG. 24-29, 1958

MEDCO ELECTRONICS COMPANY, INC.
MAIL ADDRESS: P. O. BOX 3338
3601 EAST ADMIRAL PL. • TULSA, OKLAHOMA

Department A

☐ Write for "Why the Medco-Sonlator instead of Ultra-Sound"

☐ I would like an office demonstration of the Medco-Sonlator

NAME_____

ADDRESS_____

CITY_____ STATE_____

SERVING THE PROFESSION SINCE 1932

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION

30 North Michigan Avenue, Chicago 2, Illinois

OFFICIAL JOURNAL
AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION
AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

Original contributions, exchanges and books for review should be forwarded to the Editorial Office. All business matters including advertising should be handled through the Executive Office, 30 N. Michigan Ave., Chicago 2, Illinois. The statements in the manuscripts published in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are made solely on the responsibility of the author. The American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation does not assume any responsibility for statements contained therein. Manuscripts accepted for publication in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are for exclusive publication and may not be published elsewhere.

OFFICERS

American Congress of Physical Medicine and Rehabilitation

DONALD L. ROSE, M.D.
Kansas City, Kans., President
ARTHUR C. JONES, M.D.
Portland, Ore., President-Elect
FREDERIC J. KOTTKE, M.D.
Minneapolis, First Vice-President
DONALD A. COVALT, M.D.
New York, Second Vice-President
DONALD J. ERICKSON, M.D.
Rochester, Minn., Third Vice-President
JEROME S. TOBIS, M.D.
New York, Fourth Vice-President
LOUIS B. NEWMAN, M.D.
Chicago, Fifth Vice-President
FRANCES BAKER, M.D.
San Mateo, Calif., Secretary
FRANK H. KRUSEN, M.D.
Rochester, Minn., Treasurer
WALTER J. ZEITER, M.D.
Cleveland, Executive Director
DOROTHEA C. AUGUSTIN
Chicago, Executive Secretary

EXECUTIVE COUNCIL

A.B.C. Knudson, M.D., Washington, D. C., Chairman.
Norman E. Titus, M.D., Verona, N. J., Secretary.
Robert L. Bennett, M.D., Warm Springs, Ga.
William Bierman, M.D., New York.
Earl C. Elkins, M.D., Rochester, Minn.
Kristian G. Hansson, M.D., New York.
Abraham R. Hollender, M.D., Miami Beach, Fla.
O. Leonard Huddleston, M.D., Santa Monica, Calif.
H. Worley Kendell, M.D., Peoria, Ill.
Miland E. Knapp, M.D., Minneapolis.
Frank H. Krusen, M.D., Rochester, Minn.
Gordon M. Martin, M.D., Rochester, Minn.
Walter S. McClellan, M.D., Chapel Hill, N. C.
Fred B. Moor, M.D., Los Angeles.
William D. Paul, M.D., Iowa City.
Nathan H. Polmer, M.D., New Orleans.
William H. Schmidt, M.D., Philadelphia.
Wm. Benham Snow, M.D., New York.
Arthur L. Watkins, M.D., Boston.
Donald L. Rose, M.D., Kansas City, Kans., Ex-officio.

Subscription—In the United States, its possessions, and Mexico, $7.00 yearly; Canada, $8.00; elsewhere, $14.00 the year; $0.75 per single copy; special issues $1.00 per single copy. Advertising rates on application. All advertising copy subject to acceptance by Publication Committee.

COPYRIGHT: Matter appearing in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is covered by copyright. Permission will be granted on request for reproduction in reputable publications if proper credit is given. Reproduction for commercial purposes will not be permitted.

Published monthly at Chicago, Illinois, by the American Congress of Physical Medicine and Rehabilitation. Entered as Second Class Matter at the Post Office at Chicago, Illinois.

Copyright 1958, by the American Congress of Physical Medicine and Rehabilitation.

EDITORIAL BOARD

EARL C. ELKINS, M.D., Rochester, Minn., Chairman
ARTHUR C. JONES, M.D., Portland, Ore.
FREDERIC J. KOTTKE, M.D., Minneapolis
FRED B. MOOR, M.D., Los Angeles
PAUL A. NELSON, M.D., Cleveland
OSCAR O. SELKE, JR., M.D., Houston
ARTHUR L. WATKINS, M.D., Boston

CONSULTANTS TO EDITORIAL BOARD

C. KNIGHT ALDRICH, M.D., Chicago
LENOX D. BAKER, M.D., Durham, N. C.
LEO BARTEMEIER, M.D., Baltimore
CYRIL COURVILLE, M.D., Los Angeles
ROBERT C. DARLING, M.D., New York City
OTTO GLASSER, Ph.D., Cleveland
JAMES G. GOLSETH, M.D., Pasadena, Calif.
W. HENRY HOLLINSHEAD, Ph.D., Rochester, Minn.
WILLIAM KUBICEK, Ph.D., Minneapolis
MEYER A. PERLSTEIN, M.D., Chicago

The ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is devoted to the publication of significant articles in this particular field. Contributions of interest to those in physical medicine and rehabilitation are invited. Articles are accepted only with the understanding that they are contributed exclusively to the ARCHIVES. Articles and accompanying illustrations become the property of the journal.

MANUSCRIPTS

Submit only the original copy of the article, but retain a copy for use in correcting galley proofs. Carbon copies are not acceptable for editing and typesetting purposes.

REFERENCES

References should be placed at the end of the manuscript and should conform to the style of the Quarterly Cumulative Index Medicus. No more than twenty references should be included with a manuscript.

ILLUSTRATIONS

Only reproducible illustrations will be accepted. All photographs must be black and white glossy prints, clear cut and contrasting. The size of each photograph submitted should be no larger than 5" x 7". Instructions for combining photographs are acceptable. The Editorial Board reserves the right to limit the number and size of illustrations used with any manuscript submitted for publication. Any number of illustrations over three (3) is charged to the author.

REPRINTS

Reprint order blanks with a schedule of prices will be attached to galley proofs. Individual reprints of an article must be obtained direct from the author.

COPYRIGHT

Matter appearing in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is covered by copyright. Permission for reproduction must be directed to the Editorial Board.

Detailed information covering instructions for the preparation of manuscripts for publication may be had by writing direct to the Editorial Office, 30 N. Michigan Ave., Chicago 2.

PRINTED IN U.S.A.

IF YOU ARE

. . . . . a clinician
. . . . . a research worker
. . . . . a physiologist
. . . . . a bio-physicist
. . . . . a teacher of physical medicine and rehabilitation

IF YOU WANT

. . . . . to stay abreast with what is new in physical medicine and rehabilitation

YOU MUST

. . . . . read the **Archives of Physical Medicine and Rehabilitation,** the official journal of the American Congress of Physical Medicine and Rehabilitation and the American Academy of Physical Medicine and Rehabilitation

. . . . . no other medical periodical gives you as broad a coverage in the field of physical medicine and rehabilitation . . . each month you will find in this journal informative articles on new developments, theories and practices dealing with all phases of this specialty

YOU ARE INVITED

. . . . . to send in your subscription today. Sample copy will be sent on request. Subscription price $7.00 per year; Canada, $8.00; elsewhere, $14.00 the year. Bill later if you wish. Return the coupon with your instructions.

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION,

30 No. Michigan Ave., Chicago 2.

Please find enclosed check for $7 ☐ or bill me ☐ for one year's subscription to the ARCHIVES.

Name_____

Address_____

City, Zone and State_____

THE NEW FISCHERSINE

PRICE $198.50
F.O.B. Glendale, California

ACCESSORIES INCLUDED

2 No. 555 — 3x3 electrodes
1 No. 553 — 4x8 electrode
2 No. 577 Patient cords
1 No. 580 Jumper Cord
1 No. 752 2"x2" Belt
1 No. 753 4"x2" Belt
1 Low Volt Booklet
1 Operating instructions

The R. A. Fischer T-160 is an entirely new unit. It incorporates all the favorable features of modern design and the latest in electronic components. Beautiful in appearance and inexpensive in price, it is the perfect unit where a good dependable Galvanic-Sinusoidal is needed. The T-160 furnishes continuous sinusoidal, surging sinusoidal, tube filtered continuous galvanic, tube filtered surging galvanic.

Send for complete details to:
R. A. FISCHER & CO., Dept. APM
517 Commercial St., Glendale 3, Calif.

Name_____

Address_____

City_____ Zone____ State_____

(No Obligation)

fischer

R. A. FISCHER & CO. *Manufacturers of Electro Therapy Products* SINCE 1900

FISCHERTHERM • FISCHERSINE • FISCHERQUARTZ • PEDASINE • FISCHER ULTRA SOUND

now available . . .
without charge . . .

- "Employment Outlook for Physical Therapists: A Survey of Salary and Personnel Policies" by Augustin & Ehmann. (Reprint from August, 1957 Archives of Physical Medicine and Rehabilitation)
- American Registry of Physical Therapists: Booklet of Information.
- Guide Law: An Act Defining and Regulating Physical Therapy, etc.
- By-Laws of the American Registry of Physical Therapists.

WRITE REGISTRAR
AMERICAN REGISTRY OF PHYSICAL THERAPISTS
30 NORTH MICHIGAN AVENUE
CHICAGO 2, ILLINOIS

Enjoy a wealth of
INFORMATION
and new ideas . . . all yours
WITHOUT COST!

Write for
CATALOG PM
picturing and describing our new, improved
SURGICAL and ORTHOPEDIC
APPLIANCES
for early training and
REHABILITATION

COSMEVO MFG. CO.
218 Paterson St., Paterson 1, N. J.

PHYSIATRIST

Wanted: for Director of Physical Medicine and Rehabilitation Program in large, well-equipped Rehabilitation Center and Orthopedic Hospital serving wide geographical area. Salary open. Apply: Administrator, Morris Memorial Hospital Rehabilitation Center, Milton, West Va.

PHYSIATRIST

Physiatrist needed to direct Department of Physical Medicine and Rehabilitation in a large general hospital. Department includes a large physical therapy section and a small newly formed occupational therapy section, with four full-time, one part-time Physical Therapists, and one full-time Occupational Therapist. Physician selected becomes a member of the active medical staff. He will be expected to participate in the hospital's teaching program. Financial arrangements are open. For further information, please address inquiries to John C. Mackenzie, M.D., Director, TOURO INFIRMARY, 3516 Prytania St., New Orleans, La.

OPPORTUNITIES AVAILABLE: PM&R Residency — general medical, surgical and NP teaching hospital, 1300 beds (500-bed neuropsychiatric unit). Baylor University College Medicine affiliation; three-year, board-approved residency. Regular residency annual stipend $2840 to $3550; career residency annual stipend $5915 to $8990 (Stipend dependent upon qualifications). Physicians qualified in specialty of psychiatry and PM&R are in great demand in the Veterans Administration and private neuropsychiatric institutions.' Write Manager, VA Hospital, Houston, Texas.

REGISTERED STAFF PHYSICAL THERAPIST

for well-established department in 330-bed voluntary general hospital. Wide variety of cases. Above average starting salary. Air-conditioned department. Five day work week. University city of 80,000. Apply Decatur and Macon County Hospital, Decatur, Illinois.

CALIFORNIA

positions open to Graduates of approved Physical Therapy Schools in State Hospitals, Special Schools and Veterans Home

* * *

Registration with California Medical Board is required

* * *

No experience needed to start at $395, raise to $415 after 6 months; promotions to $530

State Personnel Board
Box 70 • 801 Capitol Avenue
Sacramento, California

NEW 120-BED REHABILITATION CENTER

DES MOINES, IOWA

Iowa Methodist Hospital, which includes Raymond Blank Memorial Hospital for Children, is now adding a 120-bed rehabilitation facility. Size of total institution will increase to over 500 beds. Plans are to admit first patients early in 1959. We are now recruiting for

Rehabilitation Social Worker to do medical social work in rehabilitation setting. Masters degree in social work with medical emphasis preferred. Must have rehabilitation experience. Salary open.

Clinical Psychologist oriented to rehabilitation. Masters degree in clinical psychology minimum requirement; advanced training desirable. Salary open.

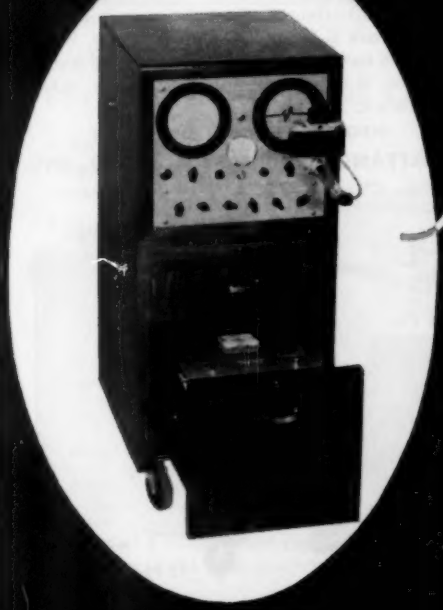
Apply Personnel Director, Iowa Methodist Hospital, 1200 Pleasant St., Des Moines, Iowa.

CHIEF PHYSICAL THERAPIST: Starting salary at the rate of $6420 per annum. Annual increments. Female only. Minimum of four years of general experience in established physical medicine department. Interest in neuromuscular and joint problems. Also concept of total rehabilitation. Ability to work with full time Board Certified Physiatrist and supervise one staff therapist essential. 200 bed general hospital. Growing out-patient service in Eastern Kentucky. Also available staff therapist position in smaller community hospitals. Salary at the rate of $5340 or $4440 per annum depending on experience. Each hospital part of integrated three-state network. Progressive minded medical staff, modern equipment, excellent personnel policy. For application forms and further information write:

MINERS MEMORIAL HOSPITAL ASSOCIATION
Box No. 61, 110 Logan Street, Williamson, West Virginia

OPPORTUNITIES AVAILABLE

WANTED PHYSIATRISTS, DIPLOMATES OR ELIGIBLE: (a) Direct department, new 450-bed general hospital, New England. (b) Director of Medical Services, physical medicine and rehabilitation department two large hospitals; Midwest. OCCUPATIONAL THERAPISTS: (c) Chief, department, large eastern teaching hospital; medical center; staff of eight; salary open. (d) Director and staff; 450-bed university hospital; city of million population; four universities; East. (e) To direct department, 700-bed general hospital; $4650-$5500; Midwest. (f) Staff; 350-bed general hospital; work performed under close medical and administrative direction; California. (g) Occupational and physical; new 65-bed hospital affiliated large teaching hospital and university; South. (h) Develop department, 400-bed hospital, near New York City; well qualified physiatrist in charge entire rehabilitation program. (i) Direct department, 150-bed children's hospital; patients from all parts U. S.; affiliated two universities; Midwest. For further information regarding these opportunities, please write Burneice Larson, Medical Bureau, 900 North Michigan, Chicago.



ENABLING YOU TO EVALUATE

Muscle action potentials

MEDITRON OFFERS YOU:

- ✓ Complete Recording of Findings
- ✓ Flexibility of Operation
  No Screening Necessary In Most Cases
- ✓ Integral Muscle Stimulator
- ✓ Interference Rejection Control
- ✓ Assured Quality by Meditron
  Specialists in Electromyographic Equipment

MEDITRON–

Single and Dual Channel Electromyographs provide every desired facility

ELECTROMYOGRAPHY

Instructional films, reprints and other information on electromyography available on request. Write today.

ACCURACY • DEPENDABILITY • QUALITY

THE MEDITRON COMPANY
708 South Fair Oaks Avenue, Pasadena, California

Please send the MEDITRON COMPANY catalog and additional information on . . .

☐ Electromyography ☐ Meditron Model(s). . . . . .
☐ Electrotherapy ☐ Instructive films
☐ Time payment plan

Your Name _____

Institution _____

Address _____

THE MEDITRON COMPANY

Modern Instruments for Electrodiagnosis and Electrotherapy

MEDITRON

708 South Fair Oaks Ave., Pasadena, Calif. • RYan 1-0101
Eastern Sales Office: P. O. Box 98, Pembroke, Mass.

HYDROCOLLATOR

Steam PACK

MOIST HEAT

Now moist heat can be applied conveniently, *effectively and with a minimum investment in* equipment. No dripping, no wringing, no repeated applications. Each application gives at least 30 minutes effective moist heat. The Steam Pack is merely heated in water, wrapped in a towel, and applied. Standard equipment in leading hospitals and clinics across the nation.

DESCRIPTIVE MATERIAL ON REQUEST

CHATTANOOGA PHARMACAL CO., INC.

CHATTANOOGA 5, TENNESSEE

MASTER UNITS

Four all stainless steel models to meet the various requirements in hospitals, clinics, physicians' offices, and patients' homes. Automatically maintains Steam Packs in water at proper temperature — constantly ready for immediate use. No plumbing used.

D-3 2 Pack

E-1 4 Pack

SS — 6 Pack

M-2

12 Pack Mobile Unit

PRONATING swing begins at the front of heel approximately at the astragalo-scaphoid joint instead of acting merely as a metatarsal abductor.

Pressure is distributed and applied at three points:

1. Laterally directed pressure over the medial border of the first metatarsal . . . A LEVER.
2. Laterally directed pressure over the medial margin of the os calcis . . . A LEVER.
3. Medially directed pressure directed opposite the calcaneo-cuboid joint . . . A FULCRUM.

An elevation in the sole under the calcaneo-cuboid joint corrects so called "rocker foot".

THE TARSO PRONATOR SHOE SUPPLIED SINGLY. . . IN PAIRS . . . IN SPLIT PAIRS

Write for descriptive folder and nearest dealer

MAURICE J. MARKELL SHOE CO., INC.

332 So. Broadway • Yonkers, N. Y.

Georgia Warm Springs Foundation

GRADUATE COURSE

Physical Therapy and Occupational Therapy In the Care of Neuro-Muscular Disease

This course is open to graduates of approved schools of physical and occupational therapy. Such graduates must be members of the American Physical Therapy Association and/or American Registry of Physical Therapists, or American Occupational Therapy Association.

Entrance Dates: First Monday in January, April and October.

Course I — Emphasis on care of convalescent neuro-muscular disease with intensive training in functional anatomy, muscle testing, muscle reeducation and use of supportive and assistive apparatus. This course is complete in itself.

Course II — Three months duration with Course I prerequisite. Emphasis on care of severe chronic physical handicaps with intensive training in resumption of functional activity and use of adaptive apparatus.

In-Service Training Program — Fifteen months duration at salary of $225 per month plus full maintenance, increasing to $250 per month at the completion of nine months. This program includes training in Courses I and II.

Tuition: None. Maintenance is $100 per month (except those on In-Service Training Program). For scholarship to cover transportation and maintenance for Courses I and II, contact National Foundation for Infantile Paralysis, Inc., 301 East 42nd Street, New York 17, New York. (Scholarships require two years of experience.)

For further information contact:

ROBERT L. BENNETT, M.D.

Medical Director

Georgia Warm Springs Foundation

WARM SPRINGS, GEORGIA

TECA
CORPORATION

a basic tool in electrodiagnosis

Teca Model CH 3

shown on No. 303 Stand →

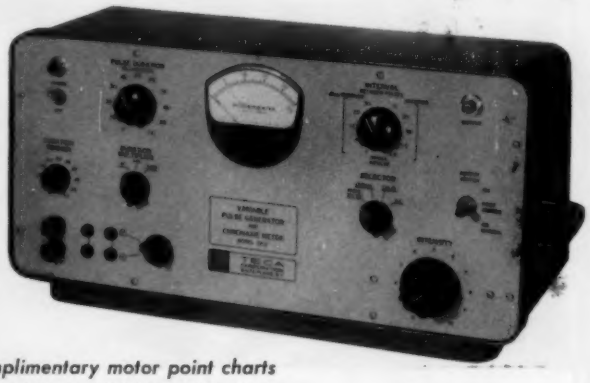
VARIABLE
PULSE GENERATOR and CHRONAXIE METER

A precise electronic instrument designed to provide accurate repeatable results in —

- Chronaxie testing
- Strength duration curves and other procedures

Incorporates a unique constant current output circuit that makes patient current completely independent of normal variations in electrode or contact resistance that occur during testing.

Instant switching between rheobase and chronaxie permits recheck of rheobase and eliminates major source of error.



Write for CH 3 Bulletin and complimentary motor point charts

TECA CORPORATION • 80 MAIN STREET • WHITE PLAINS, N. Y.

complete integrated facilities for

ELECTROMYOGRAPHY

- **SINGLE CHANNEL EMG** — **Model TE 1.2-7** — with two-channel magnetic tape recorder for recording notes and EMG simultaneously.
- **TWO-CHANNEL EMG** — **Model TE 2-7** — permits simultaneous recording and study of two EMG potentials or of one potential together with a related physical parameter such as force or pressure.

• Automatic controls and new circuits provide simplified reliable operation without shielded rooms in most locations. • EMG potentials faithfully reproduced by special recorder circuits. • Specifications equal or surpass requirements for research, teaching and clinical use.

• *NEW rugged COAXIAL NEEDLE ELECTRODE withstands autoclaving, has tapered shaft with 26 gauge tip and insulated handle.*

TECA
CORPORATION

80 Main St.
White Plains
New York

2 Hanger Legs = Independent Living

A double amputee, Harvey A. Macy, says: "The pair of Hip Control AK Hanger Limbs are as near perfect as I believe an artificial leg can be. I am satisfied with them in every detail — looks, comfort, and performance. I drive my car with only one added feature, a special hand throttle." Hanger Artificial Limbs here have made possible the important thing for every amputee — returning to self-reliant daily life. Careful fitting and manufacture have done the same for thousands of Hanger Wearers for nearly 100 years.

Hanger PROSTHESIS

AVAILABLE AT AUTHORIZED FACILITIES IN THE FOLLOWING CITIES:

Eastern Region:

BALTIMORE 1, MD.
BOSTON 15, MASS.
CHARLESTON 2, W. VA.
CHARLOTTE 4, N. C.
NEW YORK 11, N. Y.
PHILADELPHIA 7, PA.
RALEIGH, N. C.
RICHMOND 19, VA.
ROANOKE 12, VA.
WASHINGTON 13, D. C.
WILKES-BARRE, PA.

Midwestern Region:

CHICAGO 5, ILL.
CINCINNATI 29, OHIO
DALLAS 1, TEXAS
EVANSVILLE, IND.
FORT WAYNE, IND.
INDIANAPOLIS 2, IND.
OKLAHOMA CITY 3, OKLA.
PEORIA 4, ILL.
ST. LOUIS 3, MO.
WICHITA, KANSAS

Central Region:

COLUMBUS 8, OHIO
PITTSBURGH 1, PA.

Southeastern Region:

ATLANTA 1, GA.
BIRMINGHAM 1, ALA.
COLUMBIA 5, S. C.
JACKSONVILLE, FLA.
KNOXVILLE, TENN.
MIAMI 37, FLA.
MOBILE, ALA.
MONTGOMERY, ALA.
NASHVILLE, TENN.
NEW ORLEANS 19, LA.
ORLANDO, FLA.
SAVANNAH, GA.
SHREVEPORT, LA.
TAMPA 2, FLA.
WEST PALM BEACH, FLA.

PRESTON

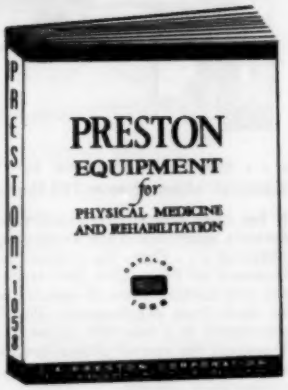
A Complete Line

FOR PHYSICAL MEDICINE AND REHABILITATION

Write today for your Free copy of

THE ILLUSTRATED PRESTON CATALOG 1058

Describes the leading and most complete Line of Equipment for REHABILITATION, EXERCISE, HYDROTHERAPY and ELECTROTHERAPY. Also: DIAGNOSTIC APPARATUS, TRACTION DEVICES, CEREBRAL PALSY FURNITURE, WHEELCHAIRS, WALKERS, LIFTERS, CRUTCHES and SELF HELP DEVICES. The Catalog is now enlarged by Supplement A.



SUPPLEMENT "A" TO PRESTON CATALOG 1058

Listing and illustrating over 100 additional items and new developments. Included are new exercise mats, new Walkers with exclusive features, a Portable Whirlpool Bath, Tilt Tables, Plastic Coniometer, Hydraulic Elevating Wheelchair Seat, Clamp-On Bathtub Lifter and a complete line of Reach Grab Bars. — *If you have Preston Catalog 1058 but have not yet received Supplement A, drop us a line and you will receive your copy by return mail.*

Featured Item for July - Write for detailed literature

THE NEW FRANKLIN MOTORIZED STANDING TILT BED

A full range of adjustments from 10° Trendelenberg to 90° by remote control switch. Special low height of 18" allows easy transfer from and to wheelchair. Can be elevated to 25", thus giving the advantage of a high-low bed. — Has many uses in physical therapy and rehabilitation — for the care of long term bed patients, cardiacs, post surgery cases and in geriatrics.

Order by Catalog Number:

PC 7192A New Franklin Motorized Tilt Bed — Model M301 including footboard, 2-crank manually operated gatch spring (less mattress), 5" locking type casters and two Safety straps. **$695.00**

PC 7192B New Franklin Motorized Tilt Bed — Model M400 — Same as above but with motorized gatch spring and three-button remote control switch. **$995.00**

ALL your needs supplied by ONE reliable source.

J. A. PRESTON CORP.

175 FIFTH AVENUE, NEW YORK 10, N. Y.

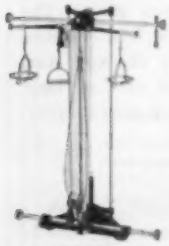
Elgin PROGRESSIVE RESISTANCE EXERCISE EQUIPMENT

Elgin Exercise Unit Model No. A-1500

. . . especially designed for the administration of over 100 therapeutic exercises!

It has been proven that exercise therapy must be accurately controlled if the desired end results are to be obtained . . . Elgin, the original designers and manufacturers of Progressive Resistance Equipment, offers the only complete line of exercise equipment designed to meet these requirements. The Elgin line has been developed, in a scientific manner, to give Doctors and Therapists the correct clinical tools with which to properly administer exercise therapy to both surgical and non-surgical patients.

It provides a wide exercise range, from simple functional exercises to the most highly definitive focal exercises. This equipment also provides a means for an effective and efficient out-patient clinic for patients requiring therapy. An Elgin sales consultant would appreciate the opportunity of assisting you in planning for the inclusion of Progressive Resistance Exercise Equipment in your physical therapy department. Write today for complete information.



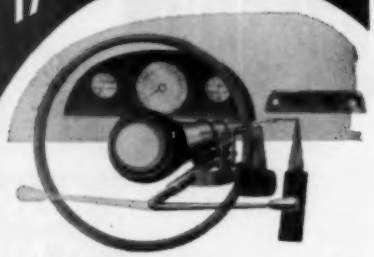
ELGIN EXERCISE UNIT
Model No. AB-150

ELGIN LEG EXERCISE
(Ankle) Model No. LE-125

Write today for information on the complete line of Elgin Exercise Accessory Equipment and Therapy Techniques, request Catalog 200.

Elgin EXERCISE APPLIANCE CO.
P. O. BOX 132 • ELGIN, ILLINOIS

HANDI-DRIVE



Enables AMPUTEES TO DRIVE

With EASE and SAFETY

Anyone unable to drive due to loss of hands, arms or legs, rheumatism or arthritis can drive again with the use of this new mechanical hand control for cars.

— Guaranteed —

Approved By
STATE HIGHWAY COMMISSIONS

Write for Information
THE LEVERAGE HAND BRAKE COMPANY
P. O. BOX 853 FARGO, NORTH DAKOTA

A thoroughly modern private Spa under conservative medical supervision

THE *Homestead*
HOT SPRINGS, VIRGINIA
M. B. Jarman, M.D., Medical Director

Heidelberg Pneumatic Arm Prosthesis

Earl F. Hoerner, M.D.
West Orange, N. J.

● The Pneumatic Arm, devised in Germany, offers an additional asset to persons who have lost part of an upper extremity, as well as those who have a disability resulting in a flaccid upper extremity, such as quadriplegia from poliomyelitis or trauma. The principle of this orthopedic appliance is the use of carbon dioxide gas as the driving force or energy used in carrying out needed functional motions of the mechanical parts of the prosthetic apparatus. This gas is enclosed in a small cylinder which is contained within the prosthetic device. The person using such an apparatus controls the motion desired by releasing the gas outlet valve through pulling on a cable, using such movements as a shoulder shrug, shoulder flexion, intrascapular excursion, body (trunk) bending, or other similar procedures. In this way, it has been possible to provide the disabled person with the following appliance motions: prehension of the hand or terminal device, pronation and supination of the forearm (a motion that has not been possible to duplicate with any other prosthetic device), elbow flexion and extension, shoulder flexion and extension. All of these motions are performed smoothly and quickly, without a time lag, and with a mild degree of energy expenditure by the wearer. This appliance has also been found useful in assisting persons, with a flaccid upper extremity to carry out needed functional motions, by applying the energy supplied by the gas to drive the mechanical parts of an upper extremity functional arm, and/or hand, and/or shoulder brace.

There is a vast difference in the prescription of a prosthesis for a leg and arm amputee. The artificial leg is prescribed and primarily fitted to the stump, while a prescription for an arm must consider the person as a whole: site of amputation, occupation, education, social status, and personality. One of the problems in providing an arm amputee with a prosthesis is that of providing adequate power sources to activate the different components of the appliance. With our present conventional methods, this depends on the motion of an extremity or bone (such as intrascapular, shoulder, or hip) through a direct connection by a cable.

The replacement of a lost hand poses a relatively simple solution for the obtaining of a power source for functional appliance use. However, tremendous difficulties face the prescription team when it becomes necessary to fit a bilateral above-elbow amputee or even more when there is an amputation at the shoulder. The problem of an adequate power source also becomes more difficult as one attempts to duplicate the range of motion and strength of the normal arm.

With these increasing demands on the performance of the prosthetic unit, a point is reached, in spite of the use of leverage and other mechanical adjustments, where the transmission of the power source to the components of the prosthesis is no longer adequate. In an effort to provide additional power sources for activation of the appliance, various methods have been used. These include Cineplastic procedures, as well as extraneous sources, such as electric motors of the I.B.M. and Vaduz arms. Now available is the Heidelberg Pneumatic Arm Prosthesis which uses high-pressure carbon dioxide as a motive power for artificial joint movement.[1, 2]

Power Source — Carbon Dioxide

This prosthesis, using carbon dioxide as an extraneous power source, was first developed by University Clinic at Heidelberg, Germany, and has been used by that group in clinical application for the past six years. The credit for recognizing the possibilities of a pneumatic system, making it serviceable for practical use, and designing the prosthesis is given to Marquardt, Hafner, and Weil.[1]

The pneumatic system of the Heidelberg Prosthesis is based on the technic of placing a servomotor (liquid carbon dioxide) between the activating muscular or joint movement and the moving components of the appliance. In this manner, the original power source (mechanical force) is converted into another medium (pneumatic force) for transmission and thereby increasing the strength, smoothness and speed of action, and range of prosthetic parts function (see fig. 1).

In addition to the various parts of the conventional prosthesis, harness, socket, forearm (if necessary), elbow joint, passive wrist flexion unit, and terminal device, the pneumatic arm includes a gas cylinder, plastic pneumatic connecting lines, valves which act as control mech-

---

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 10, 1957.

Clinical Director, Kessler Institute for Rehabilitation.

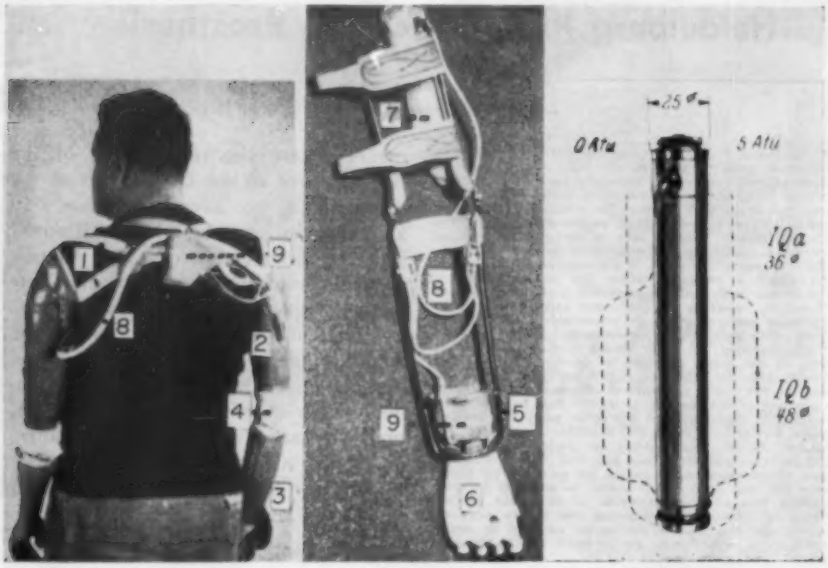


Fig. 1 — Schematic presentation of carbon dioxide as a servomotor.

anisms, inlet and outlet nozzles, and airbellows.

The carbon dioxide container (aluminum gas cylinder) is supplied in three different shapes and is built into the prosthesis in the forearm or upper arm section, or, if necessary, fixed at any other suitable place. This source of power, liquid carbon dioxide, is stored under a pressure of 45 atmospheres. Through a reducing valve the gas enters the pneumatic system of plastic tubes at a pressure of 0 to 5 atmospheres with a maximum force of 75 pounds per square inch exerted at the terminal device (see fig. 1).

Control Mechanisms

The gas stream from the cylinder passes to one of the various control mechanisms, a valve of the pressure, pull, turn, or muscle type. These valves are connected to the harness or built into the prosthesis and placed as needed in relation to the primary power source of joint or muscle action. Through the control of the valve, the gas passes to an airbellows where the pneumatic force is converted back into mechanical force for carrying out the desired appliance movement. The patient needs but little original available force to open or close the valve (control mechanism). However, through the servomotor (pneumatic system), the original impulse is instantly transferred to the prosthetic part to be activated.

These valves are designed and constructed to enable the patient to perform the following prosthetic functions (see fig. 2).

1. Hand closing.
2. Hand opening.
3. Forearm pronation.
4. Forearm supination.
5. Elbow free.
6. Elbow extension.
7. Elbow flexion.
8. Shoulder elevation and internal rotation.
9. Shoulder external rotation.

By operating the valves through changes in length of the shoulder harness cable (pull valve), stump or arm movement (pressure valve), or muscle contraction (muscle valve), the patient can regulate the pneumatic power stream in such a way that the movements of the prosthesis can be controlled in terms of

the desired speed and motion. Also several appliance motions can be carried out simultaneously. Another asset of the pneumatic system is that, after any one movement has been completed, no further power is necessary to maintain the appliance position, thus enabling the wearer to assume a relaxed and natural posture.

Types of Valve Units

Experience has demonstrated that the wearing and fitting of the valves to the body do not cause any discomfort to the patient. From a practical viewpoint, they have been designed into units known as 2-fold, 4-fold, or 6-fold valves. The terms, 2-, 4-, or 6-fold are dependent on the number of functions and movements of the prosthesis obtained from one primary power source (muscle or joint action). For example, a 6-fold valve connected to a figure-eight shoulder harness can, by varying the intrascapular spread, carry out the following prosthetic functions: hand closing, hand opening, elbow locked, elbow free, elbow extension, and elbow flexion.

Various combinations of prosthetic functions can be controlled by any one valve. The indication for the type of valve and controlling functions depends on the various needs of the patient and the site of his amputation. If necessary, two different valves can be used in a single prosthesis, as in the situation of an above-elbow amputation. Here, a 6-fold pull valve can be connected to the shoulder harness for hand and elbow control and a 4-fold pressure valve used to control supination and pronation of the hand. Upon the recommendation of the wearer of these arms, it has been found advisable to maintain separately the elbow and hand rotation functions. In all movements except shoulder function it has been desirous to maintain the various functions independent of one another and individually controlled.

Range of Motion

No provisions are made for the functions of volar or dorsal flexion of the wrist. However, in order to have the prosthesis function effectively, the actions of pronation and supination had to be extended beyond their normal physiological limits. Pronation is made possible to 135 degrees and supination to 45 degrees. This range of motion was found necessary to enable the wearer to eat effectably, especially with a fork.

The passive turning device is used for the purpose of allowing the artificial hand to be brought close to the body as is necessary in personal hygiene procedures. This unit allows for greater operational range and can be adjusted by the wearer by turning or pushing it against a stationary object.

Harness

The harness used with this prosthesis is similar to the well-known types used for conventional appliances, and determined by the patient's needs and site of amputation. The sockets, and, if necessary, the forearms, are fabricated of plastic, again similar to conventional units.

Terminal Device

The terminal device consists of a functional hand with active gripping of the thumb moving against the stationary index and middle fingers. Maximum pressure between the gripping surfaces is 75 pounds per square inch. This can be reduced by the wearer through two methods, control of the reducing nozzle at the gas cylinder outlet, or by the patient's control of the force activating the pull, pressure, or muscle valves. The position of the thumb of the hand can also be altered through a minor adjustment for the gripping of small, large, or tool instruments.

Design

Forearm Amputation. Prostheses fabricated for forearm amputation are of relatively simple design. They can be divided into three groups, depending on whether there is a short, medium, or long stump.

For a short stump, 2 or 3 inches in length, there is no need to equip the prosthesis with a pneumatically operated

elbow joint. Prehension of the hand is made possible through a 2-fold pull valve in the arm pit, or a muscle valve over the bicep muscle. No thought is given to replacing the lost motions of supination or pronation since the amputee can replace these activities by the turning control of his remaining upper arm.

With a stump of medium length, the motion of pronation and supination is present, but it cannot be used for functional purposes. However, it can be used for control of prehension of the hand by using a turn valve. Supinating the stump causes hand opening, and pronation results in hand closing. This type of ar-

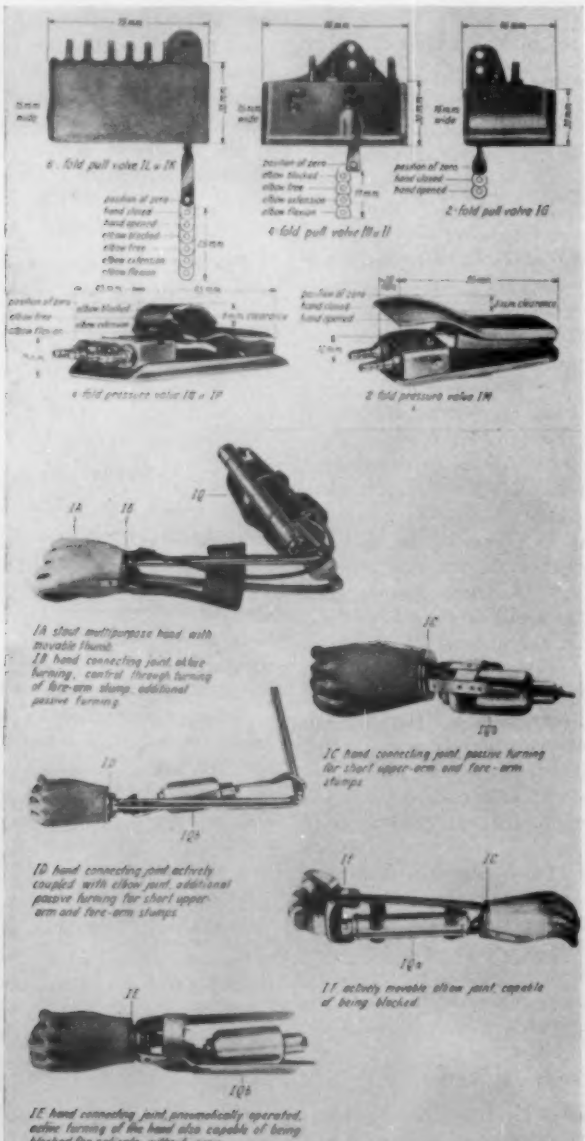

6 - fold pull valve IL = IK
4 fold pull valve IM = IL
2-fold pull valve IG
4 fold pressure valve IG = IP
2 fold pressure valve IM
IA stout multipurpose hand with movable thumb
IB hand connecting joint, elbow turning, control through turning of fore-arm stump, additional passive turning
IC hand connecting joint, passive turning for short upper-arm and fore-arm stumps
ID hand connecting joint actively coupled with elbow joint, additional passive turning for short upper-arm and fore-arm stumps
IF actively movable elbow joint, capable of being blocked
IE hand connecting joint pneumatically operated, active turning of the hand also capable of being blocked, for patients without arms

Fig. 2 — Forearm prosthesis: IK, 6-fold pull valve; IP, 4-fold pressure valve; IQ, carbon dioxide container.

Fig. 3 — Above-elbow prosthesis.

rangement allows for rapid, skillful, and easy regulated hand movements.

The long forearm has elbow flexion and extension as well as pronation and supination. In this case, muscle contractions are used for hand prehension. With the use of a muscle valve placed over functioning opposing muscle groups, antagonist and agonist, such as the extensor and flexor carpi radialis, direct control of the prosthetic hand is obtained (see fig. 2).

Above-Elbow Amputation. In above-elbow amputations, six motions must be supplied: hand closing and opening, hand pronation and supination, and elbow flexion and extension. Here is used a 6-fold pull valve connected to the shoulder harness for hand and elbow movements, and a 4-fold pressure unit used in the armpit of the opposite extremity (see fig. 3).

Shoulder Disarticulation. With a shoulder disarticulation the fitting problem is similar except for the addition of shoulder function. An additional pneumatic shoulder joint is supplied. Here a separate valve arrangement for the shoulder joint would make the operating mechanism too complicated, therefore the valve for elbow flexion has been combined with shoulder raising and internal rotation while the valve for elbow extension has been combined with external rotation of the shoulder (see fig. 4).

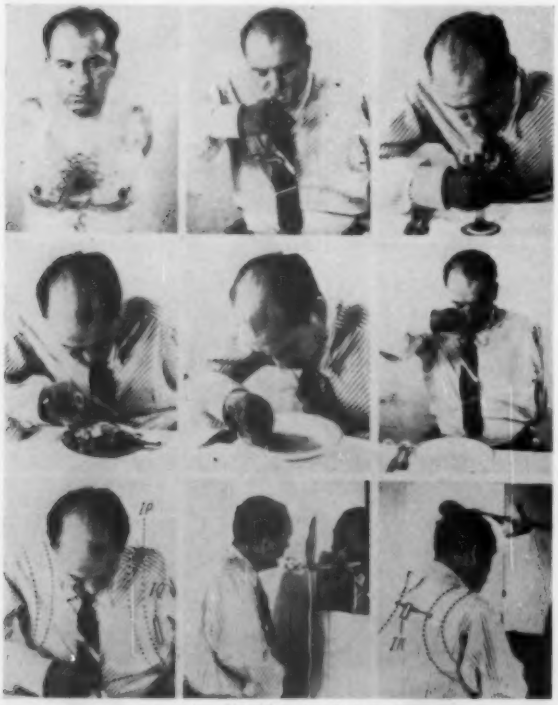


Fig. 4 — Shoulder Disarticulation

Summary

The Heidelberg Pneumatic Prosthesis makes available to the upper extremity amputee a unit of exceptional versatility; finely adjustable control and simple design.

The advantages of this prosthetic unit are:

1. Excellent control of its many functions.
2. Powerful motion at all joints.
3. Normal appearance of these motions.
4. Rotation of the hand.
5. Carry out several motions simultaneously (as needed in activities of daily living, such as eating, dressing, and hygienic processes).

The disadvantages of the unit are:

1. Lack of interchangeable parts with other units now available through local suppliers.
2. Bulkiness of terminal device (hand).
3. Constant need for replenishing of power source (carbon dioxide).

The prosthesis was designed primarily for the upper, above-elbow and shoulder amputees, but has found use in forearm amputations as well.

The illustrations in this study are reproduced with permission and originally appeared in "Technical Adequacy and Practical Application of the Heidelberg Pneumatic Prosthesis" by E. Marquardt and O. Haefner which is published and distributed by the International Society for the Welfare of Cripples, 701 First Ave., New York 17, N. Y.

References

1. Marquardt, E., and Haefner, O.: Technical and Practical Application of the Heidelberg Pneumatic Prosthesis, New York, International Society for the Welfare of Cripples, 1956.
2. Tosberg, W. A.: The Heidelberg Arm. Orthopedic and Prosthetic Appliance Journal, March, 1957.

Interpersonal Processes in a Respirator Center

Cynthia P. Deutsch, Ph.D.
Ian E. Alger, M.D.
Evelyn McNamara, M.S.
Jane Williams, M.S.
and
Judy F. Shor, B.S.
Joseph G. Benton, Ph.D., M.D.
New York City

● The purpose of this study was to investigate the quantity and quality of the continuing interpersonal process in a chronic care center. The data were gathered by means of procedures derived largely from social psychology, including structured interviews with patients and staff, daily time-sample observations, and process recording of all conferences during the period. The data were coded and the results analyzed quantitatively.

The social and psychological atmosphere in which people live and work is important to their functioning, and part of this atmosphere is the interaction of other people in the environment. The same types of variables are influential in the functioning of both staff and patients in a hospital. These factors are being more widely recognized by people who are concerned with patient care.

A recent editorial in the *Journal of Chronic Diseases*[1] calls for study of the hospital as a social system, and states that the knowledge of interrelationships between patients and personnel might actually increase the effectiveness of treatment. Kohl[2] points out that the staff may well influence the patient's recovery in a general hospital, and Jones and Rapoport[3] indicate the importance of a favorable social atmosphere for the mental patient. Seidenfeld,[4] Berengarten,[5] and Romano[6] are in agreement on the importance of good interpersonal relationships among staff and patients, while Taylor[7] discusses the beneficial effects on personnel administration of human relations studies. The relationships of nurses to patients and to physicians are explored by Germain[8] and by Schecter,[9] both of whom emphasize the benefits of a teamwork approach and interdisciplinary understanding.

Emotional aspects of the poliomyelitis patient have been explored by Saunders and Wendland[10] and Garber[11] among others, with the implication that the staff can be very influential in the actual progress of the patients. Prugh and Tagiuri[12] relate this approach specifically to the respirator care of poliomyelitis patients. Finally, Dickinson[13] emphasizes the atmosphere of the respirator center as a factor in the treatment of its patients, and indicates that an emotionally positive atmosphere helps the patient to the point where he focuses on what can be done with the remaining functional potential instead of on what he has lost: that is, that an emotionally positive atmosphere fosters a positive approach on the part of the patient.

Interpersonal relations and atmosphere have been studied in other contexts, most notably social and industrial psychology, and methods have been developed to evaluate personal interactions.[14, 15] These methods and principles can be easily related to the study of other complex group situations. Though some of the procedures require modification and others are impractical for a hospital situation, they are in the main quite applicable to the study of the interpersonal process in a patient care setting.

The purpose of the present study was to investigate the quantity and quality of the continuing interpersonal process in a chronic care center — in this case a respirator and rehabilitation center — and to attempt to relate the various kinds of interpersonal relationships to morale, general organization, and patient well-being. The focus was placed on the group process with emphasis on description, rather than an evaluation of causa-

From the New York Regional Respirator and Rehabilitation Center, Goldwater Memorial Hospital, Welfare Island, N. Y., and Department of Physical Medicine and Rehabilitation, New York University College of Medicine, New York University-Bellevue Medical Center.

This study was aided in part by an annual grant from the National Foundation for Infantile Paralysis.

tive factors. This emphasis was selected purposely, as it is felt that it is necessary first to describe; from the description certain hypotheses as to causative factors can be suggested, and these can later be tested in future experimental research.

Method of Study

1. Selection of Subjects. At the time of this study there were 29 in-patients in the two wards of the center. With this number, sampling was unnecessary, so the entire patient population was used.

Though the respirator center is located in a larger chronic disease hospital, all the employees whose work is in the center are assigned there exclusively. At the time of the study there were approximately 60 members of the daytime staff, divided into the following groups: physicians, registered nurses, practical nurses, physical therapists, occupational therapists, social workers, psychiatrist, psychologist, recreation worker, clerical workers, technicians, aides, maids, and porters. Approximately 25 per cent of this group was selected for the study, the selection being made by random sampling within work categories, but including at least one person from each category. In addition to this staff selection, the five administrative personnel of the center were included.

2. Procedures. All the data were collected within a two-week period of intensive investigation, the time period being set in advance and the collection of data organized day by day. The time selected was before the annual summer vacation exodus. During this period there were no major changes in the composition of either the staff or patient groups.

Patient Interviews: Each patient was interviewed by the same interviewer three times a week, making a total of six interviews. All the interviewing was done by five of the authors, who comprise the personnel of the psychiatric services division of the center. The interviews followed a standard form, with the same variables being assessed each time, though there was opportunity for spontaneous talk on the part of the patient, and room on the interview blank for an estimate and summary by the interviewer. The particular variables assessed were as follows:

1. Mood (patient's response to overt question checked by interviewer on 9-point scale).
2. Regular activities of the day (occupational and physical therapy, etc.).
3. Special activities of the day (outtrips, visitors, etc.).
4. Any departures from the established schedule, together with the reasons.
5. Enumeration of other patients with whom there had been contact.
6. Enumeration of staff members with whom there had been contact.
7. Report of any particularly positive or negative happening.
8. Number and topic of spontaneous verbalizations.
9. Immediate and current problems and concerns of patient.

There was little problem of rapport, inasmuch as the patients and interviewers were all previously known to each other, and cooperation was almost 100 per cent.

Staff Interviews: Each of the fifteen staff members selected was interviewed by the same interviewer twice each week, and the five administrative personnel were interviewed once a week. This was also done by means of structured interviews. The variables assessed were as follows:

1. Mood (subject's response to overt question, checked by interviewer on 9-point scale).
2. Determinant of mood (work-connected, mainly, or personal-life-connected, mainly).
3. Enumeration of special activities of day.
4. Affect associated with each of the special activities.
5. Enumeration of patients with whom there had been contact during day.
6. Enumeration of other staff members with whom there had been contact during day.
7. General analysis of day's activities, including special problems, concerns, and the like.

Also included during two of the staff

interviews was a sorting procedure, which is discussed subsequently. Additional information gathered from each staff member was his officially listed duties, his actual activities, and the frequency of change in his activities.

Sorting Procedure: The staff subject was given a group of 29 cards, with the name of a patient on each. He was first asked to put the cards into one of three slots, marked "+", "0", and "—", on the basis of which patients he most preferred to take care of, least preferred to care for, and so on. (This is subsequently referred to as the "as patient" sort.) Then he was asked to sort the patients in the same three categories according to whom he would most like to have as personal friends, least prefer, and so forth. (This is hereafter referred to as the "as person" sort.) A second sorting, following the same procedure, was done one week later by each subject, in order to check the reliability of the sorts. (Since they were highly reliable, in the statistical calculations the results of the first sorting were used exclusively.)

Time Sample Procedure: The center is geographically a self-contained unit, occupying two wards, with offices off the corridor in between. Three "observation posts" were established: one at each of the two nurses' stations and the third in the anteroom of the office of the director of the center. For the same ten-minute time span (10:55 - 11:05 A.M.) of each experimental day the activity which could be observed from each station was recorded: who walked by; in what direction, and, if possible, on what errand; who spoke to whom and about what; who answered the phone; and the like.

Process Recordings: During the two-week period there were two "grand rounds" conferences and one psychiatric conference. Attendance at these conferences is expected of all the staff who have patient care responsibilities. Roughly the same number of people attended each conference. Process records were taken at each of the meetings. The interaction was plotted at the time of the conference and all remarks were categorized under the following headings: asks a question, answers a question, initiates a topic, expresses agreement, expresses disagreement. Tape recordings were made of each conference.

Other Data Records: Records were kept about other factors which might be pertinent to the activity in the unit: weather, unusual events which would affect the entire center, and the like.

3. Treatment of Data. The interview data were coded and tabulated in appropriate categories. These data, together with the variables of age and degree of general disability, were organized into ten objective categories and the patients were ranked on each of the ten variables. The relationship of each of the variables to every other was computed by means of rank-order correlations (*rho*).

The patient-sorting data were checked for reliability (as mentioned previously) by means of *tau*. The same method was used to obtain the relationship between the as-patient and the as-person sortings.

The time-sample records were coded and tabulated according to the following categories: number of people who passed the observation post on each day; staff category of each staff member who passed it; his origin, destination, and errand; and interpersonal interaction in the vicinity of the observation post, who participated, and the nature of the interaction.

The various categories of response from the process records were tabulated and compared by means of chi-square.

Other comparisons of various aspects of the data will be enumerated in the discussion of the results.

Results

Few significant relationships were indicated by the rank order correlations, which are reported in table 1. Probabilities of .01 or better were attained only by the rhos computed between the rankings on the as-person and as-patient ratings, and the nonindependent variables of total contacts reported versus the number of patients and the number of staff reported.

Comparisons which attained the .05 level were also selected for emphasis (though not too much confidence can be

placed in relationships which yield only this level of significance). These included the correlations between the total contact reported and the as-person ratings; the mood rankings versus both the as-person and as-patient ratings; and the staff report of contacts versus the as-person rating. A further comparison, included for reliability purposes, was significant at this level: the staff report of patient contact and the patient report of staff contact.

The most significant finding in the 45 comparisons is that total motor disability was not correlated with either of the ratings, nor with mood, nor with contacts reported by either patients or staff. Age also was not correlated with any of these variables. Thus the attitude of the staff toward the different patients cannot be determined by degree of disability nor by age of patients.

To determine whether other objective facts about the patients were related to these attitude variables, median tests were run between eight of the variables (age and total disability were omitted) and the variable of sex. The patients were also divided into two groups on the basis of degree of respiratory disability. Of these sixteen comparisons, only one was significant — and that only at the .05 level: those patients with greater respiratory disability were considered less desirable as patients by the staff. Since the actual care of these patients is more difficult and complicated, probably the comparison reflects simply that.

Thus it is still not possible to explain the basis for the staff's ratings of the patients on the grounds of the kinds of variables which might *a priori* be regarded as important. However, reasoning from the fact that patient mood was related to both ratings, and that mood was independent of the other variables assessed, the hypothesis is advanced that the staff members are responding to the patients in terms of their (the patients') characteristics *as individuals* rather than *as patients*.

Another difference which negated an *a priori* assumption of relationship was that between the patients' reports of staff and patient contacts. Patients tend to have more contact with one category or else they report or remember contact with one more often than with the other. Again, this is not related to either motor or respiratory disability, or to age.

The contact data for the staff indicate that there is a relationship between the patients with whom they report contact and their ratings of the patients, but this contact is unrelated to the objective patient variables. For the staff too there is no significant relationship between the rankings of number of patients and number of staff contacts reported, though here there is a minimal relationship between the category of staff and a

Table 1: Rank Order Correlations Among Patients' Rankings on Ten Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. "As-patient" rating										
2. "As-person" rating	.85‡									
3. Total No. contacts reported	.27	.38*								
4. Patient contacts reported	.18	.26	.86‡							
5. Staff contacts reported	.26	.33	.49†	.10						
6. Staff report of contacts with patients	.65‡	.39*	.33	.21	.37					
7. General disability ranking	.29	.21	.22	.27	.03	.08				
8. Patient's mood	.38*	.44*	.10	.13	.06	—.06	.35			
9. Spontaneous verbalization .....—.07		.04	—.01	.01	.05	—.16	—.01	.06		
10. Age	.23	.15	—.19	.19	—.25	—.05	.13	.27	—.13	

*Significant at .05 level.
†Significant at .01 level.
‡Significant at .001 level.

preponderance of patient or staff contacts: the nursing staff have a higher number of patients reported, while the administrative personnel report more staff contacts. This probably simply reflects differing responsibilities.

The mood data for the staff and the patients indicate that the staff members consistently report a more positive mood than the patients. Figure 1 shows these two mood curves. Whether this difference is attributable to actual feelings or simply to what is reported is a question which cannot at present be answered, but if the latter alternative is correct, it might mean that the staff members feel they *should* have a relatively positive mood, while the same necessity is not perceived by the patients. The qualitative reports of the interviewers bear out this assumption: many times a staff subject reported a more positive mood than the interviewer judged his mien would indicate. This was much less true of the patients.

When the data gathered from the procedures other than interviews are considered, the focus is mainly on staff activity and interaction.

Though there were some differences in activity level among the three observation posts, in general the fluctuations were consistent. The data from the three posts are combined in figure 2, and it can be seen that the level of activity differed markedly from the first week of the experiment to the second. In addition, the fluctuations during the second week are considerably greater than those in the first week. Though on the basis of the data no causal factor can be definitely proposed, it can be noted that a period of extremely hot weather occurred during the first week, while the second week began with the day on which the heat broke.

When these activity data are analyzed according to staff categories, it is seen that the registered nurses account for the greatest amount of movement, with clerical personnel ranking second. Though sometimes the errands which motivated

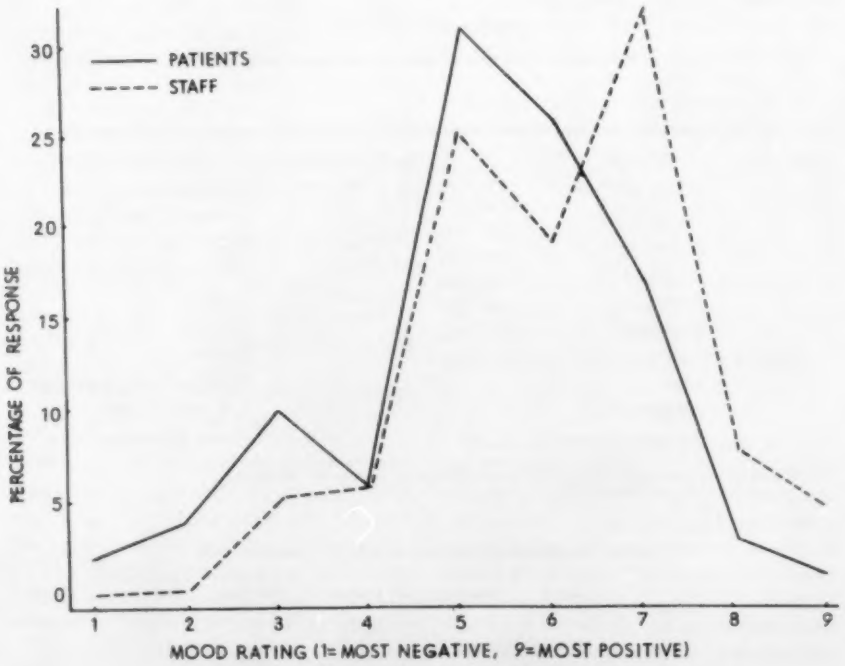


Fig. 1 — Distribution in percentage of patient- and staff-reported mood.

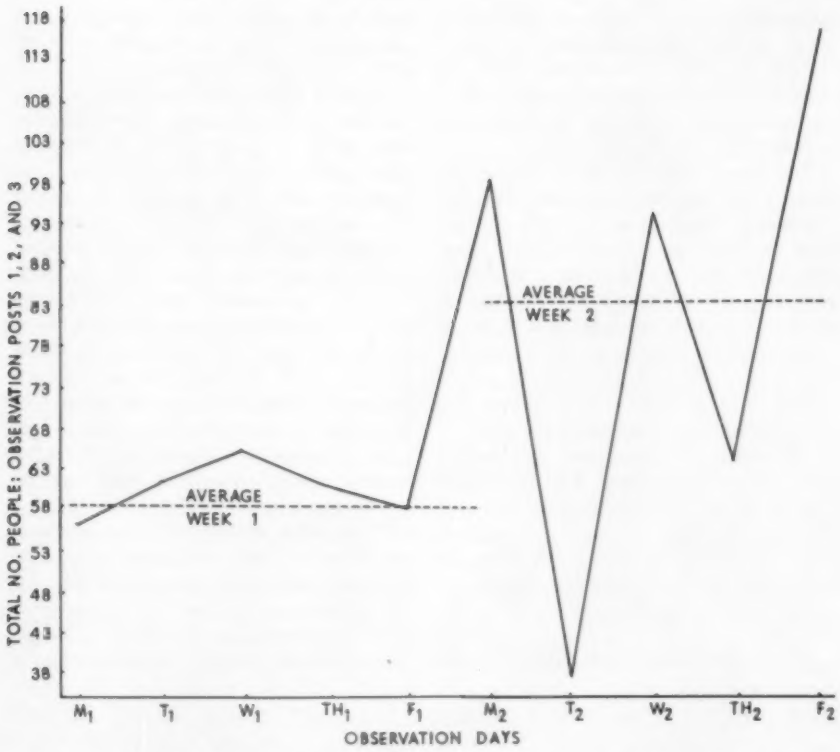


Fig. 2 — Total number of movements past and/or near all observation posts for each observation day.

Table 2: Activity Level and Most Frequent Intent of Movement Analyzed According to Staff Categories

Rank	Category	No. of Movements*	Most Frequent Intent
1.	.....Registered nurses	15.1	Administration
2.	.....Clerical workers	11.6	Secretarial and personal
3.	.....Physical therapists	11.5	Patient care
4.	.....Practical nurses	11.4	Charts and equipment moving
5.	.....Medical	10.7	Personal
6.	.....Technicians	9.5	Cannot be evaluated
7.	.....Porters	7.5	Housekeeping
8.	.....Aides	4.8	Patient care and Housekeeping
9.	.....Psychosocial	3.2†	Cannot be evaluated
10.	.....Occupational therapists	.3	Cannot be evaluated

*Refers to movements per day corrected for number of persons per category.
†An artifact, as personnel in this category were the observers.

Table 3: Distribution of Statements by Staff in Three Conferences

	Agree	Disagree	Initiate	Ask Question	Answer Question	Total
Grand rounds 1	3	2	5	8	11	29
Grand rounds 2	7	6	37	33	31	114
Psychiatric conference	12	5	29	8	7	61

the movement were not apparent, in most cases this — the "intent" of the movement — could be evaluated. These data were organized also by staff category. Table 2 presents these as well as the category rankings or activity level.

Before interpreting these data it must be pointed out that the observation posts were so located as to provide vision of the activities in the corridors, but not in the wards. This limitation is especially important in interpreting the "intent" data. In addition, for staff members whose activity is mainly centered in offices or laboratories, movement past the observation post may mean something quite different from what it does for personnel whose center of activity is the ward, the nurses' stations, or elsewhere.

With the exception of the physical therapists, all of the first five ranked categories have quite broad and general duties, and much of the work of all five is initiated by their own understanding of the needs of a situation rather than by orders from a superior. These qualities do not characterize the groups which rank sixth, seventh, and eighth. Thus, though there is some overlap in the lower half as well (ranks 9 and 10), it would seem that the more specialized, focused and directed the work of a particular staff category, the less persons in that category move from one place to another around the unit.

When the activity data are further analyzed according to the interactions which were observed, the following are seen to be the most frequently observed interactions (in order, from more to less frequent):

Registered Nurse and Practical Nurse
Physician and Physician
Aide and Patient
Practical Nurse and Practical Nurse

These interactions are consistent with the most frequently observed "intent" for each category involved.

The process records from the three conferences are the data remaining to be analyzed. Table 3 presents these data.

Inspection of the number of statements in each category for each conference reveals differences here as well as in the number of statements of all types in each conference. Chi-square tests, however, yield significance (at the .001 level) for only the differences between the first grand rounds conference and the second. The other differences are suggestive of perhaps a freer atmosphere at the psychiatric conference (29 initiative statements out of a total of 61 and proportionately less question-and-answer statements), and of a tendency to avoid disagreeing statements at all conferences, but these could not be statistically confirmed. In connection with the difference which was statistically significant it should be noted that the first grand rounds concerned a new patient, while the second was on a patient with a long residence at the center. This indicates that the staff have more to say about a patient whom they have known over a longer period of time, contrary to an often-heard assumption that it is the longest term patients who get the least attention and interest. This interpretation is somewhat vitiated by the fact that the first grand rounds conference was held during the first week—a time when the time sample data indicated that the general activity level was reduced in comparison to the second week. However, the relative distribution of statements at the two conferences is different, as well as the total number of statements, and this might indicate a difference independent of the factor which depressed the activity level during that week. In addition, the magnitude of the difference between total number of statements for the two conferences appears to exceed that of the difference between the gross activity level for the two weeks.

Comment

The statistical analysis of the data presented indicates that the patients in this chronic care center, despite the magnitude of their disabilities, are responded to according to some factor or set of factors other than their degree of illness, their sex, their age, and the like. A good hypothesis, to which the mood data contributed, is that personality variables influence the interaction here. A study is planned to investigate this. However,

the question of the application of this finding to other care centers arises.

It is possible that a more personal interaction situation is created between staff and patients as a result of the degree of care which respirator and quadriplegic patients require, or perhaps the long residence of the patients in any chronic care center creates a condition whereby the staff members come to know them as people rather than as "cases." Either way, the finding, if substantiated, has implication for the training and selection of a staff. If the staff members come to relate to the patients on a more subjective basis than might usually be expected (in, for example, a general hospital), then the staff member might well be more likely to react personally to negative effect from the patient, or will be more frustrated in not expressing his own negative reaction than would otherwise be true. If this is correct, then special care must be exercised in selecting a staff for a chronic care setting. Perhaps some of the problems can be anticipated and dealt with in the training period. Also, personnel who choose to work in a chronic care center may be those who prefer closer relationships with people than those which are usually obtained between staff and patient in a general hospital. If this were true, then this aspect of the personality of the staff member would be important in predicting his success and satisfaction on the job.

Another finding of the present study which bears further investigation is the separation between patient orientation and staff orientation on the part of the patients. The most likely hypotheses for explaining this concern the ways in which different people relate to authority, and attitudes toward illness and disability. Those people who are authority oriented might be staff oriented, and those people who are most concerned about their physical condition might also be staff oriented. It is planned to investigate this problem. If the present finding is verified, it would be useful for morale and ward management problems as well as being psychologically meaningful.

It is concluded that a study such as the present one can be helpful in describing and understanding the activities and interactions in a complex, interdisciplinary, patient care unit, and in pointing up specific areas for further investigation. A further implication relates to the possible advance in group relationship and group interaction research to be gained from thorough study of a natural situation. Group theories are too often based on selected, artificial groups; perhaps a naturalistic study of actual groups in action can help to validate the other experimental results, and can also generate more hypotheses for future experimental study.

Summary

The purpose of this study was to investigate the quantity and quality of the continuing interpersonal process in a chronic care center. The data were gathered by means of procedures derived largely from social psychology, including structured interviews with patients and staff, daily time-sample observations, and process recording of all conferences during the period. The data were coded and the results analyzed quantitatively. The primary findings were:

1. The patient's age, sex, or degree of respiratory or neuromuscular disability do not determine his level of social interaction, the attitude of the staff toward him, or his mood. The staff reacted to patients in this chronic care center as people rather than as cases.
2. Some patients tend to be staff oriented, others patient oriented.
3. The more specialized, focused, and directed the work of a particular staff category, the less they move from one place to another within the unit.
4. Contrary to a popular assumption, the staff tend to have more to say about a longer-term patient than they do about a newer one.

These findings are discussed in relationship to morale and organization problems, and some suggestions for fur-

ther study are advanced.

Acknowledgment: The authors express their appreciation to Mr. Paul Lipshitz who did the actual statistical calculations.

References

1. Leavell, H. R.: Chronic Disease and Behavioral Sciences. J. Chron. Dis. **2**:113 (July) 1955.
2. Kohl, R. N.: Administration Is a Healing Art. Mod. Hosp. **81**:92 (Oct.) 1953.
3. Jones, M., and Rapoport, R. N.: Administrative and Social Psychiatry. Lancet **2**:386 (Aug. 20) 1955.
4. Seidenfeld, M. A.: Psychological Aspects of Medical Care, Publication 44, American Lecture Series, monograph in American Lectures in Psychology, Springfield, Ill., Charles C Thomas, Publisher, 1949.
5. Berengarten, S.: Significance of Interpersonal Relationships. Am. J. Nursing **52**:1219 (Oct.) 1952.
6. Romano, J.: On Those Who Care for the Sick. J. Chron. Dis. **1**:695 (June) 1955.
7. Taylor, K. O.: How Human Relations Studies Contribute to Personnel Administration. Mod. Hosp. **79**:62 (Sept.) 1952.
8. Germain, L. D.: Personal Relationships and Nursing Service. Am. J. Nursing **52**:1257 (Oct.) 1952.
9. Schecter, D.: As Doctor Sees Nurse and the Same to You, Sir! Mod. Hosp. **81**:61 (Oct.) 1953.
10. Saunders, J. H., and Wendland, L. V.: Some Emotional Needs of Patients with Bulbospinal Poliomyelitis. Nursing Outlook **3**:374 (July) 1955.
11. Garber, M. D., Jr.: Some Emotional Aspects of Poliomyelitis. Pub. Health Nursing **44**:340 (June) 1952.
12. Prugh, D. G., and Tagiuri, C. K.: Emotional Aspects of Respirator Care of Patients with Poliomyelitis: Preliminary Report. Psychosom. Med. **16**:104 (Mar.-April) 1954.
13. Dickinson, D. G.: Role of Respirator Centers in Treatment of Poliomyelitis. Univ. Michigan M. Bull. **21**:170 (June) 1955.
14. Research Methods in the Behavioral Sciences, edited by L. Festinger and D. Katz, New York, Dryden Press, Inc., 1953.
15. Small Groups: Studies in Social Interaction, edited by P. Hare; E. F. Borgatta; and R. F. Bales, New York, Alfred A. Knopf, Inc., 1955.

3rd International Congress of Physical Medicine

IIIe Congres international de Medecine Physique

3° Congreso internacional de Medicina Fisica

3. internationalen Kongress für Physikalische Medizin

Week of

August 21, 1960

WASHINGTON, D. C., U.S.A.

Preliminary information regarding this meeting may be had from the Office of the Secretary General: WALTER J. ZEITER, M.D., or from the Executive Secretary, DOROTHEA C. AUGUSTIN, 30 North Michigan Avenue, Chicago 2, Illinois.

Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration: I. Inspiration

George H. Koepke, M.D.
Edwin M. Smith, M.D.
Alma J. Murphy, Ph.D.
and
David G. Dickinson, M.D.
Ann Arbor, Mich.

● Previous electromyographic observations in the laboratory indicated that the first intercostal muscle and diaphragm were used in quiet breathing but that expiration occurred passively. A subsequent investigation has been made of the sequence of action of intercostal muscles at measured lung volumes during the various intervals of the respiratory cycle. The measurements of lung volumes were synchronized with the electromyographic activity of the intercostal muscles of normal men. The activity of several muscles was recorded simultaneously, by means of the multiple channel electromyograph using the needle technic. The evidence indicates that the intercostals were serially recruited with deeper breathing. In most instances the first intercostal muscle showed electrical activity at the onset of inspiration. As this inspiration deepened there was successive recruitment of the second through the eleventh intercostal muscles.

A review of the electromyographic studies in the literature reveals little information about the coordinated activity of the muscles of respiration. In this laboratory,[1] it was shown that the first intercostal muscle and the diaphragm were used in quiet inspiration. When using the single-channel electromyograph, it appeared that recruitment of the lower intercostals might occur as deeper breaths were taken. Other investigators[2-4] have observed that the upper intercostal muscles show little or no activity until deep inspiration has occurred. Campbell[2] has reported that there is activity in the sixth through the eighth intercostal spaces during quiet breathing.

This study was undertaken to determine the sequence of onset of activity of the diaphragm and intercostal muscles. Simultaneous multiple-channel electromyographic observations were made of the activity of various respiratory muscles and were related to the measured lung volume during inspiration.

Method

Various intercostal muscles of eleven normal men were studied with a multiple-channel electromyograph. Each subject was placed in a supine position with his head resting on a small pillow and his upper extremities in a relaxed position. Unipolar needle electrodes were placed in the right intercostal muscles in an area extending from the mid axillary line to a line 1 cm. from the sternal border. The electrode was determined to be in an intercostal muscle when the electrical activity was produced by respiratory movement and not by movement of the overlying muscles. No effort was made to distinguish between the external and internal intercostal muscles. Several sequences, each consisting of a maximum of four alternate intercostal muscles were sampled on each subject.

The pulmonary ventilation was recorded with a continuously recording spirometer (Sanborn Metabolator) having a transducer that converted movement of the spirometer bellows to electrical energy for presentation to one of the electromyographic channels. The spirometer was modified to offer minimal resistance to air flow. The spirometer and its electrical output were calibrated to permit a direct reading from the oscilloscope of breath size in cubic centimeters. During the oscilloscope sweep time of 5 to 10 seconds it was possible to observe several shallow breaths or one deep breath. The oscilloscope sweeps were timed, synchronized, and calibrated. Time-exposure photographs were made of individual sweeps, so that spirometer

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 11, 1957.

Assistant Professor, Department of Physical Medicine and Rehabilitation, University of Michigan Medical School.

Fellow of the National Foundation for Infantile Paralysis, Department of Physical Medicine and Rehabilitation, University of Michigan Medical School.

Research Associate, Department of Physical Medicine and Rehabilitation, University of Michigan Medical School.

Associate Professor, Department of Pediatrics and Communicable Diseases, University of Michigan Medical School.

This study was aided by a grant from the National Foundation for Infantile Paralysis, Inc.

movement and electrical activity of all muscles sampled at one time were recorded on a single frame. From each photograph, onset of muscle activity was related to the corresponding point on the spirometer tracing, permitting the onset of activity to be expressed in terms of the lung volume at that moment.

All measurements of lung volume change were expressed as percentages of the predicted vital capacity[5, 6] (PVC) of the subject. Observations were recorded during shallow inspirations and also during deeper inspirations of varying sizes. A shallow or quiet breath was defined as one taken by the subject after he had been instructed to "relax and breathe quietly." When this pattern of respiration had continued for more than 2 minutes, the observations were recorded. The shallow breaths varied from 5 to 18 per cent of the predicted vital capacity, with the majority of breaths varying from 5 to 10 per cent.

The basis for distinguishing the activity of the diaphragm from the activity of the intercostal muscles was as follows: "distant" electrical activity was found in the sixth through eleventh intercostal spaces during quiet breathing. The voltage remained low and the sound distant with thorough searching of the lower interspaces, indicating that the "distant" activity was not occurring in these interspaces. During deep inspiration and forced expiration, the "distant" activity became obscured by the characteristic loud sound and high voltages of activity originating in the intercostal muscle at the needle tip. The onset of the "distant" activity preceded or coincided with the beginning of quiet breathing. On two occasions, the needle was inserted through the eleventh intercostal space directly into the diaphragm near its attachment to the anterior extremity of the twelfth rib. This approach was used to avoid the pleura and peritoneum. The activity recorded from this needle placement was loud and coincided with the onset of the "distant" activity observed simultaneously from the other intercostal spaces. This indicated that the "distant" activity found in the lower intercostal spaces was activity originating from the diaphragm.

Results

In those series of observations showing distant diaphragmatic activity, the onset of contraction of the diaphragm occurred as much as one-fourth second before the onset of inspiration as determined from the spirometer tracing. The diaphragm was always active during quiet breathing.

In 11 of 15 observations the first intercostal muscle was active during quiet breathing. The second intercostal was active 3 times in 12 observations. No activity was recorded in any of the other intercostal muscles during quiet breathing.

Observations of the pairs of alternate intercostal muscles that were active during inspiration were made from each photograph. Each member of the pair was then arranged according to its order of onset of activity. Table 1 shows the number of times that the sequence of onset in each pair occurred in a downward direction, compared to the total number of observations for each pair. The time of onset of distant diaphragm activity was compared with the onset of activity of the first intercostal muscle. The pattern of recruitment during inspiration began with the diaphragm. The intercostal muscles were then recruited in a pattern from the first to the eleventh intercostal, as shown by testing alternate interspaces. The downward trend in each pairing of alternate intercostals is statistically highly significant, with a level of confidence better than 0.001. Direct evidence of consecutive intercostal recruitment is not available since only alternate intercostals were sampled to avoid technical difficulties.

Figure 1 shows that, in general, as the subject took increasingly deeper breaths, activity occurred in progressively lower intercostals. For example, the second intercostal was active in one-half of all observations of those breaths that varied from 10 to 20 per cent of the PVC. The fifth intercostal was active in approximately one-half of the number of breaths in the 20 to 30 per cent range and the

Table 1: Analysis of Order of Recruitment of Diaphragm and Alternate Intercostal Muscle Activity

Order of Recruitment 1st	Order of Recruitment 2nd	Total No. of Observations	Observations in Sequence*	Level of Confidence†
Diaphragm	1st Intercostal	15	14	< .0001
1st Intercostal	3rd Intercostal	16	16	< .0001
2nd Intercostal	4th Intercostal	17	17	< .0001
3rd Intercostal	5th Intercostal	18	18	< .0001
4th Intercostal	6th Intercostal	31	29	< .0001
5th Intercostal	7th Intercostal	23	23	< .0001
6th Intercostal	8th Intercostal	25	23	< .0001
7th Intercostal	9th Intercostal	24	22	< .0001
8th Intercostal	10th Intercostal	11	11	< .0001
9th Intercostal	11th Intercostal	10	10	< .0001

*Number of times the upper intercostal muscle preceded the lower in time of onset of activity.
†By the binomial test

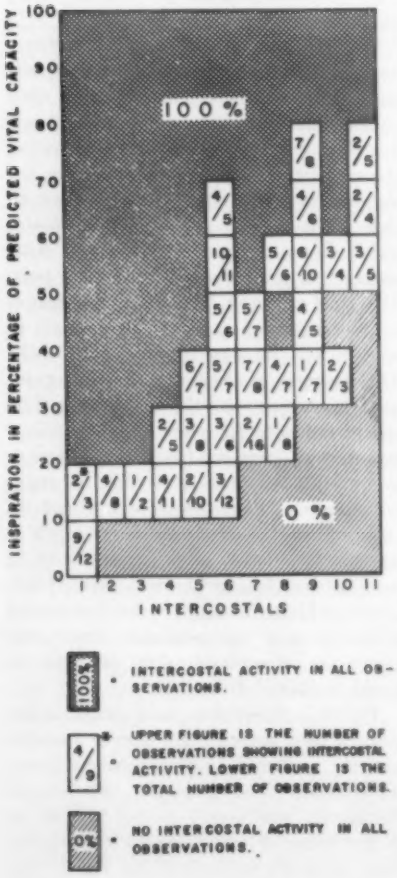

INSPIRATION IN PERCENTAGE OF PREDICTED VITAL CAPACITY
INTERCOSTALS
100 %
0 %
100% INTERCOSTAL ACTIVITY IN ALL OBSERVATIONS.
4/9 UPPER FIGURE IS THE NUMBER OF OBSERVATIONS SHOWING INTERCOSTAL ACTIVITY. LOWER FIGURE IS THE TOTAL NUMBER OF OBSERVATIONS.
0% NO INTERCOSTAL ACTIVITY IN ALL OBSERVATIONS.

Fig. 1 — Incidence of activity in each intercostal muscle as related to breath size.

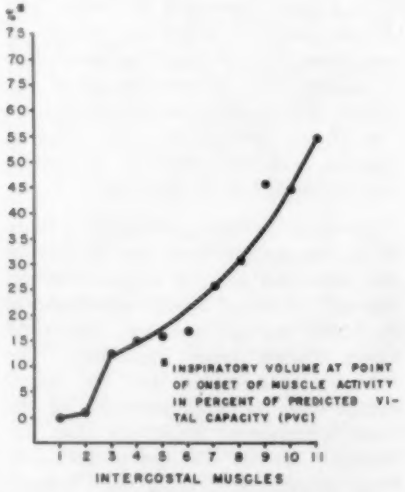

INSPIRATORY VOLUME AT POINT OF ONSET OF MUSCLE ACTIVITY IN PERCENT OF PREDICTED VITAL CAPACITY (PVC)
INTERCOSTAL MUSCLES

Fig. 2 — The median values of inspiration volume at the point of onset of intercostal activity.

eighth intercostal was active in approximately one-half of the number of breaths in the 30 to 40 per cent range. No activity was noted in the eleventh intercostal until at least a 50 per cent breath was taken. On the other hand, all observations of the first three intercostals showed activity if the breath was greater than 20 per cent of PVC, and all the intercostal muscles of all subjects were active when the breath was greater than 80 per cent of PVC.

Figure 1 also shows the transitional area for each intercostal, the area in which there is generally a gradual increase in the number of observations

showing activity. This area usually does not exceed a range of 30 per cent of PVC.

Figure 2 illustrates the sequence of recruitment of intercostal muscles during a deep breath. This graph shows the median values of all observations of the onset of activity in each intercostal muscle. The sequence established from the median values seems to indicate that, as a deep breath is taken, the intercostal muscles become active in an orderly manner from the upper to the lower interspaces.

A statistical analysis of the data used to construct the curve reveals that the differences in the set of points on the curve are highly significant (chi square test yielded a level of confidence better than 0.001). Therefore the direction of the curve indicating the pattern of recruitment is reliable.

When comparing the onset of activity of the second intercostal muscle with the points of onset of the first and third intercostals, it is observed that the second is more closely allied to the first than the third. Statistical testing (Mann-Whitney "U" test) revealed that in all observations the differences in onset between the second and third were highly significant with a level of confidence better than 0.001, but the level of confidence of the differences between the first and second fell beyond 0.05. From this it appears that the first and second intercostals act synergistically in deeper breathing.

Discussion

The use of multiple-needle electrodes to observe the activity of intercostal muscles introduced several technical problems. It was not practical to sample more than four intercostal muscles simultaneously because movements of the thorax made it difficult to maintain the tips of the electrodes accurately in the thin muscles. All subjects tolerated the testing procedures satisfactorily, but when more electrodes were inserted the added discomfort prevented relaxation. Needle electrodes occasionally caused mechanical stimulation of the intercostal muscles and this problem increased as more electrodes were inserted.

There were several variable factors inherent in this study. These included the depth and speed of inspiration, and variations in the subjects' vital capacity. These factors, however, did not alter the sequence of recruitment of the diaphragm and intercostals. It was also recognized that other factors, not a part of this investigation, might affect the sequence; for example, involuntary deep breathing, placing the subject in a position other than supine, irregular intercostal activity in areas of the thorax other than those tested, and pathological conditions affecting the chest.

The neural mechanism through which the regular recruitment of intercostal muscles is mediated offers an interesting subject for study. However, it seems clear that recruitment of intercostal muscles parallels the increased respiratory work load — that is, the increased effort to maintain adequate ventilation. Decrease in pulmonary or thoracic elasticity or increase in airflow resistance could be expected to result in more widespread intercostal muscle activity during quiet breathing. Quite possibly this electromyographic technic will offer an opportunity to further knowledge of variations in the work of breathing in various disease states affecting the respiratory system.

Summary

An electromyographic study has been made of the sequence of action of the diaphragm and intercostal muscles during measured volumes of inspiration. Observations from eleven normal men were made with the multiple-needle electrode technic. The points of onset of muscle activity were determined in various sized breaths and expressed as percentages of predicted vital capacity. During each breath, the diaphragm became active before the first intercostal muscle did. In a significant number of pairs of alternate intercostal muscles, onset of activity in the upper intercostal of each pair preceded that in the lower. The diaphragm became active as much as one-fourth second before the onset of pulmonary air flow as determined by the spirometer. During quiet breathing, the

diaphragm was always active, the first intercostal muscle was usually active, and the second intercostal was occasionally active. The remaining intercostals were never active during quiet breathing. In each intercostal the number of observations showing activity increased as deeper breaths were taken, until all observations showed activity. This phenomenon occurred in successively lower intercostals with progressively deeper breaths. During inspiration deep enough to use all intercostals, the point of onset of activity advanced progressively in successively lower intercostals.

Conclusions

Under the conditions of this experiment, there is a pattern of recruitment of the diaphragm and intercostal muscles during inspiration. The pattern begins with activity in the diaphragm and is followed by activity in the intercostal muscles. Recruitment occurs in a progressive manner from the upper to the lower intercostals during deep inspiration.

Acknowledgment: Appreciation is expressed to Charles A. Metzner, Ph.D. for his help and guidance in the statistical analysis of these data and to Dimitri V. Theofil, M.S.E.E. for design and construction of a multiple-channel electromyograph and other electronic equipment.

References

1. Koepke, G. H.; Murphy, A. J.; Rae, J. W., Jr., and Dickinson, D. G.: Electromyographic Study of Some Muscles Used in Respiration. Arch. Phys. Med. **36**:217 (April) 1955.
2. Campbell, E. J. M.: Electromyographic Examination of Role of Intercostal Muscles in Breathing in Man. J. Physiol. **129**:12 (July 28) 1955.
3. Pauly, J. E.; Jones, D. S.; Jarach, A., and Toman, J. E. P.: Vectorelectromyographic Study of Intercostal Muscles in Human Respiration. Fed. Proc. **16**:99 (Mar.) 1957.
4. Rossier, P. H.; Nieporent, H. J.; Pipberger, H., and Kalin, R.: Electromyographische Untersuchungen der Atemmuskelfunction an normalen Versuchspersonen. Ztschr. ges. exper. Med. **126**:39 (June) 1956.
5. Baldwin, E. deF.; Cournand, A., and Richards, D. W., Jr.: Pulmonary Insufficiency: Physiological Classification, Clinical Methods of Analysis, Standard Values in Normal Subjects. Medicine **27**:243 (Sept.) 1948.
6. West, H. F. A.: Clinical Studies on Respiration. VI. Comparison of Various Standards for Normal Vital Capacity of Lungs. Arch. Int. Med. **25**:306 (Mar.) 1920.

Make your plans to be in . . .

PHILADELPHIA for the ANNUAL SESSION,

AUGUST 24-29, 1958

Influence of Arteriovenous Fistula on the Distal Circulation in the Involved Extremity

Khalil G. Wakim, M.D.
and
Joseph M. Janes, M.D.
Rochester, Minn.

● By use of the venous occlusion plethysmograph with a compensating spirometer recorder, the blood flow in the lower extremities below the knee was measured before and after induction and repair of the arteriovenous fistula of the involved extremity. After the establishment of the preoperative blood flow values, a femoral arteriovenous fistula was surgically induced in the stunted limb. At various periods after operation up to about one year, the blood flow was measured in both the normal and the operated extremity and was compared with the preoperative value. After induction of the arteriovenous fistula, the blood flow in the involved extremity in each of the seven subjects was reduced, in two of them slightly, but in the remaining five significantly. In four patients with congenital or accidental arteriovenous fistula in one of the lower extremities, a similar study was made on the blood flow before and after surgical repair of the fistula. The distal blood flow in each of the involved extremities increased on repair of the arteriovenous fistula. The presence of an arteriovenous fistula in the lower extremity reduces the flow of blood to the distal parts of that extremity.

Arteriovenous fistula occurs in two types: congenital and acquired. The congenital type usually has multiple communications between the involved arteries and veins. The acquired arteriovenous fistula usually is due to trauma from bullet or puncture wounds and is generally a single, abnormal communication between the artery and vein; but it may be intentionally induced. In this paper we shall refer to the latter as induced and restrict the term "acquired" to the former.

It has been repeatedly demonstrated clinically and experimentally that in the presence of congenital, acquired, or experimentally induced arteriovenous fistula of significant dimensions, the involved extremity is usually larger in diameter and longer than its counterpart. This has led to the repeatedly stated assumption that the presence of an arteriovenous fistula quickens the growth of the tissues in the region affected. The acceleration of growth has been attributed to various factors, important among which are the increase in blood flow, increase in collateral circulation, rise in tissue temperature and in tissue metabolism with excess of oxygen, and stasis of blood in the tissues of the involved area.

In his studies on hypertrophy of extremities associated with congenital arteriovenous fistula, Horton[1] stated that an increase in length of the bones apparently occurs only when the fistula has been established for a considerable time before the ossification of the epiphyseal cartilages. In the series of cases he presented, the circumferences of the involved extremities were from 2 to 8 cm. greater than those of the corresponding normal extremities; and in 18 of the cases the bones in the abnormal extremity were from 0.5 to 7 cm. longer. Fisher and Johnson,[2] in diagnosing congenital arteriovenous communication, used the elevated temperature of the skin over the probable location as a confirmatory finding. They stated that the greatly increased rate of blood flow to the involved extremity could be measured plethysmographically.

Reid[3] emphasized that arteriovenous fistula is the greatest stimulus to collateral circulation. In the presence of arteriovenous fistula the flow of blood is directed via the collateral channels through the circuit of reduced resistance, and consequently the distal parts of the extremity are inadequately supplied with blood. Deterling, Essex, and Waugh[4] stated that in returning to the heart through the arteriovenous fistula, the blood bypasses the region of high resistance in the distal arteriolar bed; and if this shunting of blood is sufficiently great, the distal tissues are inadequately nourished.

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 13, 1957.
Section of Physiology, Mayo Clinic and Mayo Foundation.
Section of Orthopedic Surgery, Mayo Clinic and Mayo Foundation.
The Mayo Foundation, Rochester, Minn., is a part of the Graduate School of the University of Minnesota.

Janes and Musgrove[5] produced an arteriovenous fistula between the left external iliac artery and vein in 10 young dogs. These fistulae were maintained patent and functioning for from 3 to 15 months, at the end of which time measurements were made on the bones of the extremities and compared with those of the normal contralateral limbs. In the majority of the animals the length, diameter, and weight of the tibia and fibula of the extremity with the arteriovenous fistula were greater than those of the normal contralateral limb. The temperature in the medullary cavity of the femur of the extremity with an arteriovenous fistula was higher than that within the contralateral femur in the four animals in which these temperatures were recorded.

Holman[6-10] earlier, and more recently Van Loo and Heringman,[11] reported several effects on the dynamics of circulation which followed immediately the establishment of femoral arteriovenous fistulae in dogs: (1) reduction in systolic, diastolic, and mean arterial pressure, (2) increase in heart rate, (3) increase in cardiac output and stroke volume, (4) continuation of central venous pressure without change, and (5) occurrence of peripheral vasoconstriction outside the fistulous circuit, plus reduction of venous return from these areas.

Materials and Methods

In the light of the various findings and assumptions published by different authors, we decided to study the distal circulation in both extremities of youthful patients having congenital or acquired arteriovenous fistula in one lower limb and compare the findings in the two extremities, and to make similar studies after the fistula had been repaired. This we did in four cases. Furthermore, in seven additional patients who had one stunted lower extremity, an arteriovenous fistula was created between the femoral artery and vein in the midthigh of that extremity, with the approval of the parents. We arranged to compare the circulation in the normal and the stunted lower extremity before creation of the fistula as well as while it was present, the latter observations having been made at intervals up to one year after its induction.

The blood flow below the knee was measured in all patients by means of the plethysmograph with a compensating spirometer recorder, as described by Berry and co-workers.[12] The cutaneous temperature was measured potentiometrically by use of thermocouples applied to the terminal phalanx of the second toe of each extremity, to the skin over the fistula in the thigh, and to a corresponding area on the contralateral thigh.

In the patients with one stunted extremity, an arteriovenous fistula was created in that limb by side-to-side anastomosis of the superficial femoral artery and vein, the stoma being half an inch in length.[13] Both the acquired and the congenital fistulae were repaired by either quadruple ligation and excision or transvenous repair of the opening in the artery.

Results

The findings concerning blood flow in the lower extremities before and after induction of the arteriovenous fistulae in the group of seven, and before and after repair of fistulae in the group of four, are given in the accompanying table. It is evident from the values of the blood flow that, after creation of an arteriovenous fistula between the femoral artery and vein in the midthigh of the stunted extremity, the distal circulation in the extremity was reduced. After establishment of the fistulae, the blood flow below the knee was reduced by 7 to 56 per cent from the control value obtained before the fistulae were made.

In the four cases in which an arteriovenous fistula in the lower extremity was repaired, the distal blood flow increased in every instance, the amount of increase in the blood flow below the knee ranging from 9 to 53 per cent.

After the arteriovenous fistula was created between the femoral artery and vein of the stunted extremity, the temperature of the toes of that extremity fell in every case except one; in the one exception it rose 0.4 C. The reduction

Influence of Arteriovenous Fistula on the Distal Circulation in the Involved Extremity

Case	Blood Flow Below Knee, Ml./Min./100 Gm. of Tissue		Difference	
	Control	After Operation	Ml./Min./100 Gm.	Per Cent
Arteriovenous Fistula Induced				
1	2.4	1.5	−1.9	−56
2	4.8	2.6	−2.2	−46
3	2.4	2.0	−0.4	−17
4	2.4	1.4	−1.0	−42
5	3.9	1.7	−2.2	−56
6	2.9	2.7	−0.2	− 7
7	4.0	3.6	−0.4	−10
Arteriovenous Fistula Repaired				
8	4.8	7.3	+2.5	+52
9	5.9	6.5	+0.6	+ 9
10	1.5	2.3	+0.8	+53
11	1.9	2.7	+0.8	+42

in temperature in the remaining six cases averaged 2.5 C., with a range of 0.4 to 4.8 C.

In four cases the temperature of the skin overlying the fistula in the thigh was compared with that of the corresponding area on the contralateral limb, and in each instance the temperature over the fistula was 1.2 C. higher than the other.

Summary and Conclusion

By use of the venous occlusion plethysmograph with a compensating spirometer recorder, the blood flow below the knee was measured before and after induction or repair of the arteriovenous fistula of the involved extremity. After the blood flow was established in seven volunteer subjects with one lower extremity shorter than the other, a femoral arteriovenous fistula was surgically induced in the stunted limb. Thereafter the blood flow below the knee in the involved extremity in each of the seven subjects was reduced, in two of them slightly, but in the remainder significantly.

In four patients with congenital or accidentally acquired arteriovenous fistula in one of the lower extremities, the distal blood flow in each of the involved extremities increased after repair of the arteriovenous fistula.

The presence of an arteriovenous fistula in the lower extremity reduces the flow of blood to the more distal parts.

References

1. Horton, B. T.: Hemihypertrophy of Extremities Associated with Congenital Arteriovenous Fistula. J.A.M.A. **98**:373 (Jan. 30) 1932.
2. Fisher, H. C., and Johnson, M. E.: Congenital Arteriovenous Communication. Am. Surgeon **23**:112 (Feb.) 1957.
3. Reid, M. R.: Abnormal Arteriovenous Communications, Acquired and Congenital: Effects of Abnormal Arteriovenous Communications on Heart, Blood Vessels and Other Structures. Arch. Surg. **11**:25 (July) 1925.
4. Deterling, R. A., Jr.; Essex, H. E., and Waugh, J. M.: Experimental Studies of Arteriovenous Fistula with Regard to Development of Collateral Circulation. Proc. Staff Meet., Mayo Clin. **22**:495 (Oct. 29) 1947.
5. Janes, J. M., and Musgrove, J. E.: Effect of Arteriovenous Fistula on Growth of Bone; Experimental Study. S. Clin. North America **30**:1191 (Aug.) 1950.
6. Holman, E.: Arteriovenous Aneurysm: Abnormal Communications Between Arterial and Venous Circulations, New York, The MacMillan Company, 1937.
7. Holman, E.: Recognition and Treatment of Arteriovenous Communications. Internat. Clin. **4**:154 (Dec.) 1934.
8. Holman, E.: Arteriovenous Aneurysm: Its Physiologic Effects Upon Circulation and Their Importance in Relation to Surgical Treatment. California & West. Med. **30**:307 (May) 1929.
9. Holman, E.: Arteriovenous Aneurysm. Ann. Surg. **80**:801 (Dec.) 1924.
10. Holman, E.: Arteriovenous Aneurysm. S. Clin. North America **8**:1413 (Dec.) 1928.
11. Van Loo, A., and Heringman, E. C.: Circulatory Changes in the Dog Pro-

duced by Acute Arteriovenous Fistula. Am. J. Physiol. 158:103 (July) 1949.
12. Berry, M. R.; Baldes, E. J.; Essex, H. E., and Wakim, K. G.: Compensating Plethysmokymograph for Measuring Blood Flow in Human Extremities. J. Lab. & Clin. Med. 33:101 (Jan.) 1948.
13. Janes, J. M., and Elkins, E. C.: Effect of Surgically Induced Arteriovenous Fistula on Bone Growth: Report of Case. Proc. Staff Meet., Mayo Clin. 27:335 (Aug. 13) 1952.

we thought you would like to know . . .

- **that**

  Fifteen scientists whose work spanned two continents over a period of more than a century and two famous laymen who organized the fight against poliomyelitis are honored in the Polio Hall of Fame at Georgia Warm Springs Foundation. Bronze busts of these honored individuals are the work of the noted sculptor, Edmond R. Amateis of Brewster, N. Y.

- **that**

  To show that science can be fun, an interesting new booklet for young people (and adults, too!), *Adventures in Science at the Smithsonian,* has just been published by the Smithsonian Institution in Washington, D. C. This profusely illustrated booklet was designed expressly to help stimulate an interest in science by the youth of America. For additional information write the Education Department, Colortone Press, 2412-24 17th St. N.W., Washington 9, D. C.

- **that**

  The $1,300,000 five-floor Rehabilitation Institute of the Boston Dispensary was formally opened as the first unit of its kind in New England equipped to meet the needs of an estimated 116,000 physically handicapped persons in the six-state area. The modern structure incorporates a departure from the traditional hospital, both in interior design and patient routine.

- **that**

  The Internal Revenue Service has ruled that physicians on a full-time staff basis with hospitals do not have to include in their gross income those checks received from patients and which are immediately endorsed over to the hospital.

- **that**

  To offer the public the best protection in case of an accident involving radiation, the Atomic Energy Commission has set up a nationwide network of radiological personnel specially trained in safety technics. The teams, made up of scientists, engineers and physicians, when called on will monitor radioactive materials and advise local officials and physicians on extent of the hazards and the proper steps to take for their control.

- **that**

  Bills have been sponsored for a National Allergy Month. The idea is to focus public attention on the need for more research in allergic diseases.

Uses of Miniature Furniture in Aphasia Retraining

Joshua Ehrlich, M.D.
and
Jeanne C. Cook, M.A.
Albany, N. Y.

● Methods for evaluating the aphasic patient and planning individualized therapy, taking into consideration the educational and vocational background, as well as the type and extent of the aphasia are described. Description, purpose and use of a specific type of equipment — separate, miniature "rooms" and household objects, tools and other kinds of furnishings to scale — are given. Three case studies illustrate the uses of this device.

The use of miniature furniture was introduced in the VA Hospital, Louisville, Kentucky, under the direction of one of the co-authors; it consisted of a six-room doll house with appropriate furniture.

At Albany VA Hospital, a modification of this doll house, which retains the advantages of the original equipment, is used now and presents some advantages of its own in general usefulness and effectiveness. Our purpose is to describe the ways in which we are implementing these miniature rooms and furniture in the speech clinic.

Evaluation of Patients

The bulk of the patient load comprises elderly males with aphasia and right hemiplegia secondary to a cerebrovascular accident. A few of these patients who had been left-handed, but who have hemiplegia on the left side, had been trained for right-handedness.

Our evaluation of the patient follows this general procedure: Before the patient is interviewed, his chart is carefully studied, with particular attention to his history. The patient's age, former occupation, educational level, possible special interests, and handedness are fair indices for treatment and certainly help in determining the level of language to which the therapist should aspire. If English is his second language, another clue is given in diagnosing the aphasia and also a starting point of using his native tongue, if possible, in therapy. The patient's age and his potential for vocational rehabilitation are important. Equally intensive effort is made to restore maximum language for *every* patient, but a longer-than-usual period of treatment may be necessary for the patient who can, and should, return to work.

When it is feasible, an interview with some member of the patient's family is most helpful in augmenting the information on his chart and in discovering his pre-illness personality; it also gives an idea of the home situation to which he will return after treatment. If the family seems sufficiently mature and interested in the patient, it may be possible to have them carry out the therapy at home and thus shorten the period of treatment in the hospital.

The patient's vocational background gives an idea of the type of visual and auditory signs and symbols that can best be used in retraining. A pharmacist may respond to symbols for chemical compounds; an auto mechanic may be stimulated by objects and pictures referring to his trade. (For this reason, we plan to expand our "furniture" to include miniature equipment relating to as many occupations as possible.) The work history also provides a dependable clue to the extent of pre-illness language skills. The literary truck driver and the artistic jockey are phenomena revealed by television quiz programs, but they are exceptional. Ordinarily, language skill is increased by necessity. The man who must use a rather high level of language in earning his bread will be more adept than the man who needs only the most concrete terms in carrying on his trade.

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 13, 1957.

Chief, Physical Medicine and Rehabilitation Service, VA Hospital; Assistant Clinical Professor of Physical Medicine, Albany Medical College.

Language Retraining Therapist, Educational Therapy Section, Physical Medicine and Rehabilitation Service, VA Hospital.

After the study of the chart and the family is completed, the initial interview between patient and therapist takes place. By means of this interview and whatever language tests it seems wise to use, in view of the patient's attention span and anxiety level, how the patient is attempting to deal with his aphasia and through which sensory channels he can be reached are discovered. Auditory and visual comprehension and retention, and muscular coordination, particularly of the speech mechanism, are easily tested. Retraining by associating an organized activity in the least affected area with an activity in the area of greatest loss can then begin. (For example, the patient with receptive aphasia, whose visual orientation and retention test high, can be started on auditory training with visual clues.)

Following the initial interview and tests, report is made indicating type and extent of aphasia, line of therapy to be followed, probable length of time needed for optimum results and the goal for extent of eventual recovery. During the course of therapy, re-evaluations are made as necessary.

Equipment and Method

Since the *raison d'etre* of language is communication, all equipment above and beyond the physical presence of patient and therapist is secondary; it is useful in proportion to its capacity for stimulating speech. For example, a tape recorder, which is used for recording the patient's progress, occasionally has the effect of increasing anxiety and inhibiting speech. In this case, the initial record should not be made until the patient is ready to accept the procedure. Tongue depressors, used for tongue-resistance exercises or increasing sensation, are sometimes better replaced by bubble gum or peanut butter. (Conversely, these latter are of little use to the patient with dentures.) Conventional reading and writing materials remind some patients of unhappy schoolroom experiences and must be discarded for cartoons or card playing or drawing activity. Of course, excellent rapport between patient and therapist must be established before any form of treatment can begin.

These prerequisites of rapport and adaptability are particularly important when introducing doll house furniture as a therapeutic device. Fortunately, so far, this equipment has met with almost universal acceptance by the patients and with some rather good results.

The equipment consists of miniature rooms and furniture to scale sufficient for a six-room house. The rooms are similar to stage sets (about 12″ x 10″ x 20″) without ceilings and with front opening wider than the back wall for easy access. The patient with hemiplegia on the right side who must use his left hand for everything is usually clumsy; he needs plenty of space for vertical and lateral hand movements, especially if he is going to place small objects. He often has a strong objection to using his left hand at all — and, if he knocks that hand against corners and surfaces while trying to manipulate objects, he will soon become frustrated and give up all efforts. So things are made as easy as possible for him with a broad front opening and no ceiling closure on these rooms.

Why isn't the conventional six-room doll house set up for him? Because, first, the brain-damaged patient is easily distracted and deals more effectively with one unit at a time than with a sequence. Second, this furniture is used to retrain the patient to "categorize." With this setup he can be told, "Here is a room. Make it a *dining* room." After some demonstration, he can then understand (even if he lacks auditory comprehension) that he is to group furniture of a common purpose together. This is much more easily accomplished by giving him one "stage set" than by confronting him with six cubicles grouped together (which probably suggest nothing to him) and letting him furnish one of them.

As we know from Goldstein,[1] the "loss of abstract attitude" is the primary loss of the brain-damaged patient. We cannot completely restore the ability to think on a progressively abstract level (an ability which, after all, varies with all

"normals"), but we can make a beginning toward restoration by drill in *grouping* materials. How much easier it is to use everyday objects of this size, none more than an inch and a half high, than to present an enormous number of *real* objects (hammers, saws, beds, windows, screwdrivers, dining room tables, lamps, sewing machines, overcoats, and so forth) and try to have the patient group *them!* When the expressive aphasic patient needs to "suit the word to the action," as in: "*pound* with the hammer," "stand up," "*drink* the water," this can be done with a minimum of equipment. Categorizing is something else again and requires a plethora of objects.

This, then, was the original purpose of our "doll house project": To provide training for the aphasic patient in recognizing similarities and differences. However, this equipment (dependent on the ingenuity of the therapist) can probably be used in many other ways. It is three-dimensional — it is visual; it is tactile; it has color; it has great mobility. With it, the patient cannot only categorize, he can attach names and printed words to objects and he can tie objects and their functions together. Auditory training can be provided by giving commands involving any number of objects. Visual retention can be drilled and visual orientation and hand-eye placement improved.

Case Studies

Case 1. Case 1 offers a good example of the use of the furniture in categorizing. A 63-year-old, right-handed white male was admitted August 6, 1956, with the diagnosis of thrombosis of the left middle cerebral artery with right hemiparesis and aphasia since July, 1955. Thus, he was first seen about 11 months after onset of illness.

Education was at third-grade level. Some "expressive" aphasia was overlaid with anxiety produced by the rather taxing hospital situation. (He had been interrogated many times in regard to his occupation and schooling, the paucity of which obviously embarrassed him.) Oral responses on a simple level were intact; spontaneous speech was hesitant but, except for complicated propositional speech, intact. A sample of speech on this level from our initial recording, follows:

Therapist: Have you any brothers or sisters?
Patient: Oh, yes.
Therapist: How many?
Patient: Er, five . . . five brothers . . . er, five *sisters.*
Therapist: How many brothers?
Patient: Five, er, four brothers . . . let's see . . . six . . . no, no . . . five . . .
Therapist: Are you the baby of the family?
Patient: No, I've got two brothers.
Therapist: Older than you?
Patient: That's right.

(The difficulty evident here is in separating the categories of brother and sister. The patient communicated only his idea of a vaguely large family.)

Writing and reading were both affected, but probably not much below the premorbid level.

Given the command: "Furnish a bedroom," the patient began immediately to select the proper furniture, showing that he understood the term, "bedroom." He worked very slowly, apparently questioning each piece of furniture he picked up. Eventually, within one-half hour, he selected all proper bedroom furniture. Asked to name the pieces, he had some difficulty, always in proportion to the unfamiliarity of the object. For example, *bed* was easy for him; *dressing table* was impossible. The second time we confronted him with categorizing: "Furnish a dining-room," he completed the task in 15 minutes. This reflected, perhaps, increased confidence as well as the strengthened ability to categorize. However, as we continued the drill, it was obvious that the patient actually improved his ability to *deal with* categories.

When the patient was discharged from the hospital, this ability had apparently carried over to his regular existence: He was able to respond to questions about his wife, about the hospital, about his home — without getting these categories mixed up, as he had done at the beginning of treatment. He was never able

to write coherently or to demonstrate reading ability, but this was judged commensurate with his low level of education. It was planned for him to enter a sheltered workshop in his area, after discharge, which took place on November 21, 1956.

Case 2. A 62-year-old, right-handed white male who had a thrombosis of the left middle cerebral artery on February 24, 1956, resulting in right hemiplegia and aphasia, began treatment in the speech clinic about seven months after onset of illness. On examination, he evidenced a predominantly expressive aphasia with confusion in internal speech. For example, asked, "Where do you live?" he replied after long hesitation, "I tan't." Urged to try to say the place name, he tried various tongue and lip positions, grimacing silently, then said, "You'll laugh." Assured that any effort would be acceptable, he said, "Ee-ja-bo." He would, however, repeat almost any word.

On the command, "Set up a bedroom," the patient selected dining room furniture. He was then helped to identify a bed and, with this start, rather quickly furnished a bedroom, showing that he had relatively little difficulty in categorizing. Although he did not immediately comprehend the oral command, since he had, like all aphasic patients in our clinical experience, *some* receptive difficulty, he was able to follow it after a concrete, visual demonstration. In response to the request to *name* the articles of furniture, he made obvious efforts but could only reply, "I tan't." (Articulation at this point was generally on the baby-talk level, and the patient expressed his needs, when he was able to speak coherently at all, in the language of infancy.)

The furniture was now used in various forms of "naming" drill. The daily session began with the patient's identifying the article from hearing its name. Then he would identify *and* repeat the name. Finally he would attempt to name the articles independently. *Identification* and *naming* were difficult for him if we deviated from a set order of listing the furniture. After a month of this drill the patient had retained most of the "learned" names of articles and had most of them available in spontaneous speech. Interestingly, this relearned ability to associate a spoken name with an object carried over to objects not used in drill and the patient's ability to communicate improved noticeably.

Further use of the furniture is being made in this patient's therapy by drill in matching a printed word to its proper object. As in retraining his oral speech, we began on the single-word level and are now working toward three or four word phrases expressing the function of the object, such as, "light the lamp," and "sit in a chair." From observing the patient's speech performance in group therapy, we can see the real and steady progress he is making since beginning treatment four months ago. This patient is still under treatment and is expected to reach a level of language skill sufficient for all self and social needs.

Case 3. A 61-year-old, right-handed, white male who had a thrombosis of the left middle cerebral artery on August 16, 1956, resulting in right hemiparesis and aphasia, began speech therapy three weeks after onset of illness. This case demonstrates the use of the furniture in training auditory retention.

The oral responses of the patient on a simple social level were good, so that, in a casual interview, he was able to conceal his aphasia satisfactorily.

On careful observation, however, it became apparent that he had difficulty in auditory comprehension, and word finding, and a tremendous deficit in auditory retention. (He retained a span of only two digits, and he could not follow a two-step command.) Visual comprehension and writing were less affected.

Auditory training was started using the furniture as a visual and tactile aid. One room was set up as a kitchen. The therapist named each piece of furniture. Then the patient was given a two-step oral command: "Put the cup in the sink." With demonstration he was able to do this. Over a period of five weeks of therapy, he progressed from this level to operating with six objects

in three different relationships in response to oral command; that is, dealing with a cup, lantern, shoe, table, bed, and chair, he could place one *on, under* or *beside* another according to oral instruction. His slow but steady improvement reflected a real relearning process. Increase in auditory retention of language was, of course, followed by a great enlargement of language available for oral expression. The patient was discharged from the hospital four months after admission. He returned to his clerical job in the post office where he is able to handle his former duties very satisfactorily, according to his superior officer. At present he attends the speech clinic once a week as a "nonbed occupant" and is still making progress.

Discussion and Summary

The ability to communicate verbally is a vital factor in interpersonal relations from about the age of two years to the end of life. Normally, language develops through three main levels: from the first, which we call that of "self-need," through the second, of "social language," to the highest, of "conceptual language." When loss of function occurs as a result of brain damage it strikes the top level first and progresses downward toward the most primitive level, until we reach the state of the true "global aphasic," who cannot use even the language of gesture in a meaningful way. Any level of loss produces anxiety, but the more aware of his loss the patient is, the more anxious he is liable to be.

Thus, in an holistic approach to the patient, we assume that he suffers a generally reduced intellectual function and a commensurate degree of anxiety. This makes the planning of the initial interview extremely important. Before the patient is seen, the therapist makes a preliminary evaluation by means of a study of his history and an interview with his family, if any. When the patient first enters the clinic, he must be made to feel welcome and physically comfortable. Our treatment room is large, airy, and pleasant, and a special table has been built for the convenience of wheelchair patients. Complete privacy is secured for the first few interviews and the atmosphere is kept as free as possible from that of a "test" situation. Much care goes into establishing patient-therapist rapport, since good results cannot be obtained unless the patient feels both complete trust in his therapist and some real hope that she can help him regain language.

When the patient has been brought to accept the idea that speech therapy will have real value for him, any of the modalities can be introduced. It is at this point that we like to present him with the miniature "stage set" and request him, verbally or by demonstration, to furnish it. This activity can be performed without verbalization and it provides an opportunity for observing the patient's recognition of objects and methods of "cataloging" them. The sets are constructed so as to allow the patient to reach into them and handle the doll-sized furniture with a minimum of awkwardness.

After the type and extent of the patient's aphasia has been analyzed, the sets and furniture can be used in therapy to retrain him in the area of his greatest loss.

The three case narratives illustrate the employment of the furniture in "auditory training," in "naming," and in "categorizing." Other uses of the furniture have also been devised.

Because of its qualities of familiarity, color, solidity, and mobility, this type of equipment has been found to lend itself in a variety of ways to the retraining of the aphasic patient.

Reference

1. Goldstein, K.: Language and Language Disturbances, New York, Grune & Stratton, Inc., 1948.

IMPORTANT NOTICE TO ACADEMY MEMBERS

Please take notice that at the annual business meeting of the American Academy of Physical Medicine and Rehabilitation, August 25, 1958, The Bellevue Stratford, Philadelphia, the following amendments to the By-Laws will be presented to the general membership for acceptance or rejection.

ARTICLE III — MEMBERSHIP

Section 1 — Classes of Members — The Academy consists of three types of members with the qualifications, rights and duties hereinafter stated:

(a) Active Members
(b) Senior Members, and
(c) Honorary Members.

Active Members and Senior Members shall be designated as Fellows of the American Academy of Physical Medicine and Rehabilitation.

Section 2 — Active Members.

(a) Qualifications — To be eligible for nomination to active membership, a person must be a certificant of the American Board of Physical Medicine and Rehabilitation.

(b) Election — An eligible person may be nominated for active membership by two Active Members, one to act as proposer and the other as seconder, in writing to the chairman of the Membership Committee, supplying such information and executing such application or nomination form as the Committee shall require. At the ensuing annual session, the Committee shall report the names of all nominees received in the preceding year. At the following annual session, the Committee shall report on the qualifications of the nominees and a vote taken thereon. The Committee shall not, however, present any nominee concerning whom it has received, by at least three months prior to the annual session, written objections from ten or more members, which objections, in the opinion of the Committee, are valid objections to membership. The nominees presented by the Committee shall come up in executive session for election or rejection by the membership. A nominee shall be elected on the favorable vote of two-thirds of the members present and voting.

Section 3 — Senior Members.

(a) Qualifications — A person who is sixty-five years of age or more and who has been an Active Member in good standing for fifteen or more years, or since the establishment of the Academy or within two years thereafter is eligible to be a Senior Member. Senior Members are exempt from the payment of dues.

(b) Election — An eligible person may be elected to senior membership (1) on application to the Membership Committee or (2) on the recommendations of the Committee and on the favorable vote of three-fourths of the members present and voting at any Executive Session of an Annual Session.

Section 4 — Honorary Members.

(a) Qualifications — To be eligible to be an Honorary Member, a person must either be (1) a licensed physician practicing physical medicine and rehabilitation in a country other than the United States or Canada, or (2) an outstanding scientist or one who has rendered outstanding services to the specialty of physical medicine and rehabilitation.

(b) Election — Any Active Member may suggest to the Chairman of the Membership Committee the name of a person deemed to be eligible for honorary membership, supplying such information and executing such forms as the Committee may require. The Committee shall then, if it deems the person so suggested eligible, nominate him at an Executive Session of the ensuing annual meeting for election or rejection by the Membership.

Section 5 — Rights of Members — The right to hold office, to vote, and to participate in the Executive Sessions of the Annual Session is limited to Active and Senior Members. All other rights of membership may be exercised by Honorary Members.

Amend Article III, Section 1, to read as follows:

Section 1 — Classes of Members — The Academy consists of four types of members with the qualifications, rights and duties hereinafter stated:

(a) Active Members
(b) Senior Members
(c) Honorary Members, and
(d) Corresponding Members.

Active Members and Senior Members shall be designated as Fellows of the American Academy of Physical Medicine and Rehabilitation.

Amend Article III, Section 2(b), to read as follows:

(b) Election — An eligible person may be nominated for Active Membership by two Active Members, one to act as proposer and the other as seconder, in writing to the Chairman of the Membership Committee,

supplying such information and executing such application or nomination form as the Committee shall require. The Membership Committee shall consider all applications and send to the membership, at least three months prior to the Annual Session, the names of all nominees whom the Committee proposes to present for election as Active Members. The Committee shall not, however, present for election any nominee concerning whom it has received written objections from ten or more members by at least thirty days prior to the Annual Session, if in the opinion of the Committee, the objections are valid. The nominees presented by the Committee shall come up in Executive Session for election or rejection by the membership. A nominee shall be elected on the favorable vote of two-thirds of the members present and voting.

Amend Article III, Section 3 to read as follows:

Section 3 — Senior Members.

(a) Qualifications — A person who is 65 years of age or more and who has been an Active Member in good standing for 15 years or more is eligible to be a Senior Member.

Amend Article III by providing for a new Section 4 to read as follows:

Section 4 — Corresponding Members.

(a) Qualifications — To be eligible to be a Corresponding Member, a person must be a legally qualified doctor of medicine in a country other than the United States or Canada and must have training, experience and recognition comparable to that of a Diplomate of the American Board of Physical Medicine and Rehabilitation.

(b) Election — An eligible person may be nominated for Corresponding Membership by two members of the Academy, one to act as proposer and the other as seconder, in writing to the Chairman of the Membership Committee, supplying such information and executing such application or nomination forms as the Committee shall require. The Membership Committee shall consider all applications and send to the membership, at least three months prior to the Annual Session, the names of all nominees whom the Committee proposes to present for election as Corresponding Members. The Committee shall not, however, present for election any nominee concerning whom it has received written objections from ten or more members by at least thirty days prior to the Annual Session if, in the opinion of the Committee, the objections are valid. The nominees presented by the Committee shall come up in Executive Session for election or rejection by the membership. A nominee shall be elected on the favorable vote of two-thirds of the members present and voting.

Renumber Section 4 (a) and (b) to Section 5 (a) (b).

Renumber Section 5 to Section 6.

Amend Article III, Section 4, to read as follows:

Section 5 — Honorary Members.

(a) Qualifications — Honorary Membership may be bestowed on a person whose work in Physical Medicine and Rehabilitation has been so outstanding that he has become renowned nationally or internationally or, to a person who has made some unusual contribution to the field of Physical Medicine and Rehabilitation.

(b) Election — Any Active Member may suggest to the Chairman of the Membership Committee the name of a person deemed to be eligible for Honorary Membership, supplying such information and executing such forms as the Committee may require. The Committee shall then, if it deems the person so suggested eligible, nominate him at an Executive Session of the ensuing Annual Session for election on the favorable vote of three-fourths of the members present and voting.

Amend Article III, Section 5, to read as follows:

Section 6 — Rights of Members — Active and Senior Members shall have the right to hold office, to vote, and to participate in the Executive Sessions and scientific meetings of the Academy. Corresponding and Honorary Members shall have all rights and privileges of Active Members except the right to hold office and to vote.

ARTICLE VI — BOARD OF GOVERNORS

Section 1 — Composition — The Board of Governors consists of the President, President-Elect, Vice President, Secretary, Treasurer, and three elected governors chosen in the manner provided in Article IV of these By-Laws.

Section 2 — General Powers — The Board of Governors shall carry out the mandates and policies of the Academy, including the appointment of an Executive Secretary of the Academy, as determined by its voting members. Subject only to the provisions of these By-Laws and to all resolutions and enactments of the voting members passed at any executive session of any meeting, regular or special, the Board has full and complete power and authority to perform all acts and to transact all business for and on behalf of the Academy and to manage and conduct all property, affairs, work and activities of the Academy. The Board shall have such other powers and duties as these By-Laws may elsewhere provide and as the Academy may in addition grant or impose.

Amend Article VI, Section 1, to read as follows:

Section 1 — Composition — The Board of Governors consists of the Immediate Past President, President, President-Elect, Vice-President, Secretary, Treasurer, and three elected governors chosen in the manner provided in Article IV of these By-Laws.

ARTICLE VIII — FINANCES

Section 1 — Raising of Funds — Funds for conducting the affairs of the Academy may be raised by (1) such initiation fees and annual dues as are imposed on Active Members; (2) such special assessments as the Academy may determine; (3) voluntary contributions, devises, bequests and other gifts, and (4) any other manner approved by the Academy.

Section 2 — Fiscal Year — The fiscal year of the Academy is from January 1 to December 31, inclusive.

Section 3 — Initiation Fee and Annual Dues — An applicant elected as an Active Member shall pay an initiation fee of $50.00. An Active Member shall pay annual dues of $10.00, which are due and payable between January 1 and March 1 of each year. Active Members whose dues are in default at the time of the annual session are subject to such disciplinary measures as the Academy at that time may determine.

Amend Article VIII, Section 1, to read as follows:

Section 1 — Raising of Funds — Funds for conducting the affairs of the Academy may be raised by (1) such initiation fees and annual dues as are imposed on the members; (2) such special assessments as the Academy or Board of Governors may determine; (3) voluntary contributions, devises, bequests and other gifts and (4) any other manner approved by the Academy or Board of Governors.

Amend Article VIII, Section 3, to read as follows:

Section 3 — Initiation Fees and Annual Dues — An applicant elected as an Active Member shall pay an initiation fee of $50.00. Active Members and Corresponding Members shall pay annual dues in such sums as may be determined by the Board of Governors, which are due and payable between January 1 and March 1 of each year. Members whose dues or assessments are in default at the time of the Annual Session are subject to such disciplinary measures as the Academy at that time may determine. Senior Members and Honorary Members are exempt from the payment of dues and assessments.

ARTICLE XII — COMMITTEES

Section 1 — The Standing Committees — The standing committees of the Academy consist of:

(a) The Membership Committee;
(b) The Scientific Program Committee, and
(c) The Nomination Committee.

Section 2 — Composition, Term and Appointment of Standing Committees — Each of the standing committees consists of three members, appointed by the President for terms so arranged that ultimately annually the President shall appoint one member of each committee to serve a term of three years. Annually, thereafter, at the close of the Annual Session, the President shall appoint one member of each committee to serve for a term of three years. If a member of any standing committee dies, resigns or becomes disqualified, the President may appoint a successor to serve for the unexpired portion of the term. Each committee shall designate its own chairman.

Section 3 — Duties of Standing Committees.

(a) The Membership Committee — The Membership Committee shall perform such duties as are consistent with the provisions of Article III of these By-Laws, in informing the membership as to its estimation of the qualifications of applicants for membership.

(b) The Scientific Program Committee — The Scientific Program Committee shall arrange for the scientific program and scientific exhibits to be presented at each Annual Session.

(c) The Nomination Committee — The Nomination Committee shall present to the appropriate Executive Session of each Annual Session the names of members whom it recommends for election to offices that are then vacant or will be vacant at the close of the Annual Session. However, any voting member of the Academy may nominate from the floor, and the election for any particular office, if necessary, shall be between the member recommended by the Committee and any nomination made from the floor.

Section 4 — Other Committees — Except as may conflict with the duties of the standing committees, the Academy or the President may appoint any other committees, so constituted and for such purposes as the Academy or the President, as the case may be, may see fit, provided however, that a presidential committee may not be created for a term in excess of one year.

Amend Article XII, Section 3 (c), to read as follows:

(c) The Nomination Committee — The Nomination Committee shall publish at least 30 days before the Annual Session, in the *Archives of Physical Medicine and Rehabilitation,* and shall present to the appropriate Executive Session of each Annual Session the names of members whom it recommends and

nominates for election to offices that are then vacant or will be vacant at the close of the Annual Session. However, any voting member of the Academy may nominate from the floor. Election shall be by majority vote of those present and voting. The report of the Nomination Committee, nominations from the floor, if any, and the election shall be a special order of business one hour after the scheduled time for the opening of the Executive Session.

These amendments were submitted in accordance with Article XIII — Amendments of the By-Laws which read as follows:

These By-Laws may be amended at any session, annual or special, by the vote of at least two-thirds of the Active and Senior Members present and voting, provided that any proposed amendment (1) has been submitted in writing to the Secretary and (2) notice thereof has been mailed to each voting member or has been inserted in the official publication at least one month prior to the session at which it is acted on.

American Association of Electromyography and Electrodiagnosis

Scientific Meeting

Jefferson Medical College, Philadelphia

Sunday, August 24, 1958

For complete details write George H. Koepke, M.D., Secretary-Treasurer, University Hospital, Ann Arbor, Mich.

WE WANT TO KNOW ABOUT YOU—

your activities, local and national, are of interest to us. *Remember, what may not be news to you is news to others.* Please send all information before the 15th of the month. The news blank is for your convenience — **send it today!**

— MEMBERSHIP NEWS —

Archives of Physical Medicine and Rehabilitation

W h o ?

W h a t ?

W h e r e ?

W h e n ?

W h y ?

American Academy of Physical Medicine and Rehabilitation

Officers and Committees

1958

Officers

President — George D. Wilson
President-Elect — Louis B. Newman
Vice-President — Clarence W. Dail
Secretary — Harriet E. Gillette
Treasurer — James W. Rae, Jr.
Executive Secretary — Dorothea C. Augustin

Board of Governors

Robert W. Boyle
Clarence W. Dail
Harriet E. Gillette
Louis B. Newman
Max K. Newman
Ray Piaskoski
James W. Rae, Jr.
George D. Wilson

Advisory Committee for Advancement of Physical Medicine and Rehabilitation

Louis B. Newman, *Chairman*
Frances Baker
Joseph G. Benton
Donald A. Covalt
Harvey F. Davis
Murray B. Ferderber
A.B.C. Knudson
Lewis A. Leavitt
Herman L. Rudolph
Charles D. Shields
Emmett M. Smith
Samuel S. Sverdlik
George D. Wilson
Solomon Winokur

By-Laws

Robert W. Boyle, *Chairman*
Earl C. Elkins
Glenn Gullickson, Jr.
Miland E. Knapp
Frederic J. Kottke
Donald L. Rose
Dorothea C. Augustin, *Ex-officio*
F. Manley Brist, *Ex-officio*

Economics in Private Practice

Arthur A. Rodriquez, *Chairman*
Dominic A. Donio
Leonard J. Yamshon

Grievance

Clarence W. Dail, *Chairman*
Carl C. Hoffman
Lewis A. Leavitt

Liaison with American Congress of Physical Medicine and Rehabilitation

Louis B. Newman, *Chairman*
Harriet E. Gillette
Ray Piaskoski

Liaison with American Hospital Association

H. Worley Kendell, *Chairman*
Frank H. Krusen
Oscar O. Selke, Jr.

Liaison with Association of American Medical Colleges

Charles D. Shields, *Chairman*
James W. Rae, Jr.
Jerome S. Tobis

Liaison with Electromyography, Ultrasonics, and Mechanotherapy

William D. Paul, *Chairman*
O. Leonard Huddleston
David Rubin

Liaison with Anesthesiology, Pathology, and Radiology

Joseph L. Koczur, *Chairman*
Glenn Gullickson, Jr.
Ray Piaskoski
Ralph E. Worden

Membership

A.B.C. Knudson, *Chairman*
Sedgwick Mead
Edward M. Krusen, Jr.

Nominating

Herman L. Rudolph, *Chairman*
Glenn Gullickson, Jr.
A.B.C. Knudson

Program

Charles S. Wise, *Chairman*
Joseph G. Benton
Charles D. Shields

Research in Orthetics and Prosthetics

Herbert W. Park, *Chairman*
Robert L. Bennett
Roy H. Nyquist
Donald L. Rose
Odon F. von Werssowetz
Charles S. Wise

American Academy

OF PHYSICAL MEDICINE AND REHABILITATION

TWENTIETH ASSEMBLY

Preliminary Program

Painful Syndromes of the Spine

SCIENTIFIC SESSION

MONDAY, August 25 — 9 A.M.

Burgundy Room

Presiding — CHARLES D. SHIELDS, Washington, D. C.

Assisting — JOSEPH BENTON, New York City

ADDRESS OF WELCOME

George D. Wilson, M.D., President
American Academy of Physical Medicine and Rehabilitation

9:30 **Functional Anatomy of the Vertebral Spine.**

OTHMAR SOLNITSKY, M.D. (by invitation), Professor of Anatomy, Georgetown University School of Medicine, Washington, D. C.

11:00 **Radiological Interpretation of Painful Syndromes of the Spine.**

BERNARD S. EPSTEIN, M.D. (by invitation), Chief, Department of Radiology, The Long Island Jewish Hospital, New Hyde Park, L. I., N. Y.

SCIENTIFIC SESSION

MONDAY, August 25 — 2 P.M.

Burgundy Room

Presiding — CHARLES S. WISE, Washington, D. C.

Assisting — HARRIET E. GILLETTE, Gainesville, Fla.

2:00 **Diagnosis and Management of Painful Syndrome of the Vertebral Spine.**

ALLEN S. RUSSEK, M.D. (by invitation), Associate Professor, Clinical Physical Medicine and Rehabilitation, New York University College of Medicine; Attending Physician, Physical Medicine and Rehabilitation, Institute of Physical Medicine and Rehabilitation; Director, Physical Medicine and Rehabilitation, Hospital for Joint Diseases, New York City.

3:00 **Psychosomatic Aspects of Back and Neck Disability.**

Speaker to be announced.

4:00 **PANEL DISCUSSION OF TOPICS PRESENTED DURING BOTH SESSIONS.**

Participants: Doctors Solnitsky, Epstein, Russek, and Erwin R. Schmidt, Jr., Orthopedist, University of Pennsylvania, Philadelphia.

PROPOSED PRINCIPLES OF PRACTICE

of the

American Congress of Physical Medicine and Rehabilitation

These standards of professional conduct are the result of the findings of the Committee on Ethics (1957) of the American Congress of Physical Medicine and Rehabilitation. The Board of Governors of the Congress, by official action on November 19, 1957, endorses these proposed principles of ethical practice and requests that these principles be adopted by the general membership at the business meeting during the 36th annual session, August 24-29, 1958, The Bellevue Stratford, Philadelphia.

I affirm my devotion to the service of humanity and will do everything I can to merit the confidence and sacred trust of my patients. My responsibility to my patient is my first obligation.

I affirm my adherence to the "Principles of Medical Ethics" of the American Medical Association and my determination to practice the profession of medicine and the specialty of physical medicine and rehabilitation in accord with them.

I will stand ever ready to make available my skills, services, and knowledge to my colleagues and will cooperate with them so that advances in medical knowledge particularly in physical medicine and rehabilitation will be available to them and their patients.

I affirm my obligation to do my utmost to protect the profession, the specialty of physical medicine and rehabilitation, and the public against physicians deficient in moral character or professional competence.

I affirm that upon undertaking the care of a patient I shall not neglect him or discontinue my care without giving adequate notice.

I am free to choose whom I shall serve, but I will not solicit.

I will not dispose of my services under terms or conditions which

hinder or impair the free and complete exercise of my independent medical judgment and skill;

cause deterioration of the quality of medical care, and

permit the sale of my services by any hospital, corporation, rehabilitation center, or lay body, by whatever name called or however organized, not licensed to practice medicine.

I will not solicit nor accept a position which is occupied by another physiatrist without first consulting with that physiatrist.

I will not divide fees for professional medical services performed by me directly or indirectly with any other person.

I will not participate, directly or indirectly, in any program contrary to law or in any program for the rendering of professional medical services which is not under the direction and supervision of a licensed doctor of medicine.

AMERICAN CONGRESS OF PHYSICAL MEDICINE and REHABILITATION

Thirty-Sixth Annual Scientific and Clinical Session

Preliminary Program

GENERAL INFORMATION

RULES GOVERNING THE READING OF PAPERS

No paper or address before the Congress shall occupy more than fifteen minutes in its delivery. The program is so arranged that all time is utilized and it is therefore imperative that the stated time schedule be followed closely.

All papers read before the Congress shall become the property of the Congress for publication in the official journal, **ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.** Each paper shall be deposited with the assisting officer of the session when read. No publicity shall be released concerning papers scheduled for presentation at the Congress, either before or after presentation, except through the proper officials of the American Congress of Physical Medicine and Rehabilitation.

REGISTRATION

The registration desk will be open from 10:00 a.m. until 5:00 p.m., Sunday, August 24. Tickets for the Congress/Academy dinner will be available. It is important that everyone register before entering the meeting areas. Those not wearing the official badge will be refused admission. This meeting is not open to the general public.

A registration fee will be charged: $10.00 for physicians and like categories; $5.00 for all therapists other than registrants of the American Registry of Physical Therapists.

Registrants of the American Registry of Physical Therapists who are in good standing and can produce evidence of such good standing at the registration desk will be registered without charge.

BUSINESS SESSIONS

The annual business meetings of the general membership of the Congress will be held on Tuesday, August 26, 4:00 p.m. and 7:30 p.m., and Thursday, August 28, 4:00 p.m.

CONGRESS/ACADEMY DINNER

The Congress/Academy dinner will be held on Wednesday, August 27, at 7:00 p.m. Dress is optional. Exhibitors and guests are welcome. Musical entertainment will be provided by Howard Lanin and his orchestra.

AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

The American Academy of Physical Medicine and Rehabilitation will hold its annual scientific session and business meeting on Monday, August 25.

SCIENTIFIC EXHIBITS

Scientific exhibits will be on display and should prove of great interest to all in attendance. As is customary, medals will be awarded to those exhibits which are adjudged outstanding by the Committee on Awards for Scientific Exhibits. The awards will be announced and presented at the Congress/Academy dinner.

TECHNICAL EXHIBITS

The program of the scientific sessions has been arranged to allow time for visits and inspection of the technical exhibits. Since these have been given considerable thought and effort, we urge every member and guest to set aside sufficient time for a complete tour of all exhibits.

Exhibits will be open from 8:30 a.m. to 5:00 p.m. on Tuesday, August 26 through Thursday, August 28 until 3:00 p.m.

EDITORIAL BOARD

The annual meeting of the Editorial Board of the **ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION** will be held on Sunday, August 24, 2:00 p.m.

SCIENTIFIC FILMS

Scientific films will be shown during the time of the meeting. Please check program for actual running times of films.

VETERANS ADMINISTRATION

Seventh Annual Conference of VA Chief Consultant and VA Area Consultants, Physical Medicine and Rehabilitation Service, Sunday, August 24, Room 108, 10:00 a.m. Co-Chairmen: Charles D. Shields, M.D., and A. B. C. Knudson, M.D.

Tenth Annual VA meeting for Chiefs, Acting Chiefs, Assistant Chiefs, Staff Physiatrists, Consultants and Attending Physiatrists, Physical Medicine and Rehabilitation Service; Crystal Room, Thursday, August 28, 12:00 noon, at luncheon. Tickets may be purchased at desk in registration area. This luncheon meeting is also open to wives and special guests of VA personnel.

SCHEDULE OF DAILY ACTIVITIES

36th ANNUAL SESSION

SUNDAY, August 24

10:00	Registration — Grand Ballroom Foyer
10:00	Meeting, Veterans Administration Consultants, Room 108
2:00	Meeting, Editorial Board, Archives of Physical Medicine and Rehabilitation — Gold Room
6:00	Dinner, Editorial Board, Archives of Physical Medicine and Rehabilitation — Pink Room

MONDAY, August 25

8:00	Registration — Burgundy Room Foyer
9:00	Scientific Session, American Academy of Physical Medicine and Rehabilitation, Burgundy Room
9:30	Coffee Hour, Woman's Auxiliary, American Congress of Physical Medicine and Rehabilitation, Green Room
12:00	Luncheon

2:00 Scientific Session, American Academy of Physical Medicine and Rehabilitation, Burgundy Room
4:00 Board of Governors, American Academy of Physical Medicine and Rehabilitation, Gold Room
7:00 Annual business meeting, American Academy of Physical Medicine and Rehabilitation (members only), Burgundy Room

TUESDAY, August 26

8:00 Registration — 18th Floor Elevator Foyer — Inspection of Exhibits
9:00 Scientific Session, Rose Garden
9:00 Scientific Session, Burgundy Room
9:30 Coffee Hour, Woman's Auxiliary, Green Room
10:00 Board of Governors, Pink Room
10:00 Meeting, Woman's Auxiliary, Green Room
12:00 Luncheon — Inspection of Exhibits
2:00 Formal Opening Session, Rose Garden
4:00 Congress business meeting (first session), **members only**, Rose Garden
7:30 Congress business meeting (second session), **members only**, Rose Garden

The Executive Council will meet in the Rose Garden immediately after the second session of the Congress business meeting.

WEDNESDAY, August 27

8:00 Registration — 18th Floor Elevator Foyer — Inspection of Exhibits
9:00 Scientific Session, Rose Garden
9:00 Scientific Session, Burgundy Room
9:30 Coffee Hour, Woman's Auxiliary, Green Room
12:00 Luncheon — Inspection of Exhibits
2:00 Scientific Session, Rose Garden
7:00 Congress/Academy Annual Dinner, Burgundy Room

THURSDAY, August 28

8:00 Registration — 18th Floor Elevator Foyer — Inspection of Exhibits
9:00 Scientific Session, Rose Garden
9:00 Scientific Session, Burgundy Room
9:30 Coffee Hour, Woman's Auxiliary, Green Room
12:00 Luncheon — Inspection of Exhibits
12:00 Luncheon and Meeting, VA Personnel, Crystal Room
2:00 Scientific Session, Burgundy Room
4:00 Congress business meeting (third session), **members only**, Burgundy Room

FRIDAY, August 29

8:30 Registration — Burgundy Room Foyer
9:00 Scientific Session, Burgundy Room
10:00 Board of Governors, Pink Room

GENERAL SCIENTIFIC SESSION

TUESDAY, August 26 — 9 A.M.

Rose Garden

Presiding — CARL C. HOFFMAN, Denver
Assisting — JAMES W. RAE, JR., Ann Arbor, Mich.

9:00 **An Experimental Study on the Possible Use of Ultrasound in the Presence of Surgical Metal Implants.**

JUSTUS F. LEHMANN, M.D., Professor, Department of Physical Medicine and Rehabilitation, University of Washington, School of Medicine;

GEORGE D. BRUNNER, B.S. (by invitation), Department of Physical Medicine and Rehabilitation, University of Washington, School of Medicine;

KATHERINE E. LANE (by invitation), Department of Physical Medicine and Rehabilitation, University of Washington, School of Medicine, and

JACK W. BELL (by invitation), Department of Physical Medicine and Rehabilitation, University of Washington, School of Medicine, Seattle.

Conditions in which metal implants are commonly used are frequently accompanied by the development of joint contractures, which are difficult to combat. The use of shortwave and microwave diathermy is contraindicated in most of these cases, as the metal implant itself or the tissues in the vicinity may become overheated. In this study, the acoustic properties of the metals used as implants are determined and compared with those of tissues. The resulting effect of the metallic implants on the distribution of ultrasonic intensity is studied. Other factors, such as heat conductivity, also determine the temperature distribution in the tissues of specimen. The resulting temperature distribution has been measured. These results obtained in specimen have been verified in experimentation with live pigs. Not only has the temperature distribution been measured in live pigs under therapeutic conditions, but histologic studies have also been conducted.

9:15 **Effects of Ultrasound on Growing Bone.**

JUSTINE L. VAUGHEN, M.D. (by invitation), Instructor, Department of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan, and

LEONARD F. BENDER, M.D., Associate Professor of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan and University Hospital, Ann Arbor, Mich.

The epiphyseal area of growing bone is currently considered a contraindicated site for ultrasonic therapy. Previous studies show that damage occurs to bone cortex and bone marrow with high intensities of ultrasound. The effect of clinical doses of ultrasound upon the epiphyses of growing rabbits was studied. The left knee area of 20 animals was treated underwater with 1 w/cm² from a 12 cm² sound head for five minutes daily from the age of three months until there was x-ray evidence of epiphyseal closure (6-8 months). The untreated legs served as controls. Comparison of the data showed no significant difference in bone length, microscopic appearance or rate or manner of epiphyseal closure between the treated and control leg.

9:30 **Plantar Wart Treatment with Ultrasound.**

HERBERT KENT, M.D., Associate Professor, Department of Physical Medicine, University of Oklahoma School of Medicine, University Hospitals, Oklahoma City.

The methods of treating plantar warts are almost legion, but with the advent of ultrasonic therapy, there is now a mode which may resolve the disadvantages of other methods. This is a preliminary report of nine patients with plantar warts whose duration ranged from one month to seven years and who received ultrasonic therapy with what may be described as spectacular results. All patients but for one were relieved of their discomfort with disappearance of lesions. No recurrences have occurred although insufficient time has elapsed for ascertaining a "cure."

9:45 **Electrocardiographic Changes in Chronic Anterior Poliomyelitis.**

ROY T. McREYNOLDS, M.D. (by invitation), Staff Physician, California Rehabilitation Center, and

O. LEONARD HUDDLESTON, M.D., Ph.D., Medical Director, California Rehabilitation Center, Santa Monica, Calif.; Clinical Professor of Physical Medicine, School of Medicine, University of Southern California, Los Angeles.

Electrocardiographic examinations were made on a series of 70 severely involved anterior poliomyelitis patients. All except four of the patients were adults and the examinations were made four to twelve months after the onset of poliomyelitis. None of the patients had a previous history of rheumatic fever or other cardiac disease prior to poliomyelitis. Six or seven per cent of the severely involved poliomyelitis patients showed persistent abnormalities of the electrocardiogram, which were regarded as permanent changes. The alterations of the electrocardiogram occurred in the S T segment and T wave abnormalities.

INTERMISSION — INSPECTION OF EXHIBITS

10:30 **A New Approach to Treatment of Whiplash Injuries and Cervical Radiculitis.**

DAVID RUBIN, M.D., Ph.D., Instructor in Physical Medicine, University of Southern California Medical School, Los Angeles; Department of Physical Medicine, and Attending Staff, Sawtelle VA Hospital, West Los Angeles.

The generally accepted treatment of the auto whiplash injury and cervical radiculitis, resulting from degenerative changes in the cervical spine, utilizes some form of immobilization and mechanized or static traction. The symptoms of pain and stiffness, resulting from either of the foregoing conditions, are frequently made worse rather than improved by such therapy. Over the past 18 months a total of 50 patients has been treated on an office visit basis with a program of manual mobilization and manually applied traction therapy preceded by some form of moist heat and either ultrasound or microtherm. The use of rhythmic stabilization procedures and repeated daily exercises for the cervical musculature to restore range of motion and to decrease muscle spasm has resulted in a relatively rapid and gratifying recovery rate in almost all patients so treated. The oft encountered whiplash headache has also been found to clear rapidly with this regimen.

10:45 **Use of the Hydrocollator in the Treatment of Neck and Shoulder Pain.**

EDWARD M. KRUSEN, JR., M.D., Medical Director, Department of Physical Medicine and Rehabilitation, Baylor University Hospital, and

YVONNIE M. CORDRAY, M.D. (by invitation), Department of Physical Medicine and Rehabilitation, Baylor University Hospital, Dallas, Texas.

This report is based on a study of more than 100 patients with symptoms of pain in the neck and shoulder and headache, classified as "cervical syndrome." The purpose of this study was to evaluate the use of Hydrocollator packs as opposed to short wave diathermy for therapeutic results. All patients selected were treated by the Hydrocollator pack as the only form of heat. This was usually followed by deep sedative massage and an active neck exercise program. There were several patients in this group who were treated with Hydrocollator packs because short wave diathermy was contraindicated. Patients were divided according to sex and classified on the basis of etiology. Results of treatment were determined for each group. The results obtained by the use of the Hydrocollator in relieving symptoms compared favorably with those previously obtained for a similar group of patients treated by short wave diathermy.

11:00 **Quantitative Antispastic Effects of Ten Medications.**

WILLIAM J. ERDMAN, II, M.D., Chairman, Department of Physical Medicine and Rehabilitation; Associate Professor of Physical Medicine and Rehabilitation, Graduate School of Medicine, University of Pennsylvania, and

ARTHUR J. HEATHER, M.D., Instructor in Physical Medicine and Rehabilitation, School of Medicine, University of Pennsylvania, Philadelphia; Medical Director, Eugene DuPont Hospital and Rehabilitation Center; Director of Physical Medicine and Rehabilitation, Memorial Hospital, Wilmington, Del.

In a previous report an objective technic for measuring spasticity was given in which the electrical potentials generated in the gastrocnemius muscle and the force of the plantar flexion were recorded. The Achilles tendon was stimulated by a force of constant known magnitude. Twenty-five patients have been followed over a 15-month period during which time the dosage of fifteen commercially or experimentally available preparations with reported antispastic qualities was given in varying amounts. Patients were tested five days weekly and all other factors were controlled as carefully as possible. This is a report of the results of this study.

SCIENTIFIC FILMS

Methocarbamol (Robaxin) — A New Interneuronal Blocking Agent: *Color, sound, 20 minutes.*
Presented by Herbert W. Park, M.D.

The Use of Celastic in Temporary Bracing in Peripheral Nerve Injuries: *Color, silent, 15 minutes.*
Presented by Israel Muss, M.D.

GENERAL SCIENTIFIC SESSION

TUESDAY, August 26 — 9 A.M.

Burgundy Room

Presiding — LEONARD J. YAMSHON, Los Angeles
Assisting — JOSEPH L. KOCZUR, Chicago

9:00 **A Study of Contractures in Muscular Dystrophy.**

KENNETH C. ARCHIBALD, M.D., Assistant Professor of Medicine (in Physical Medicine), Department of Medicine, Cornell University Medical College; Chief, Department of Physical Medicine, New York Hospital-Cornell Medical Center, New York City, and

PAUL J. VIGNOS, JR., M.D. (by invitation), Assistant Professor of Medicine, Western Reserve University, School of Medicine; Director, University Hospitals Muscular Dystrophy Clinic, Cleveland.

The status of 45 muscular dystrophy patients actively being followed over the past three years in the Muscular Dystrophy Clinic at University Hospitals of Cleveland has been reviewed. The study reveals certain significant correlations in the functional status and muscle strength with the degree and progression of joint contractures. This study particularly emphasizes the disabling effect of the different types of contractures, particularly in the lower extremity, and compares the results of a well-outlined conscientiously applied stretching program with the natural progression of joint contractures in muscular dystrophy. Environmental factors are directly related to the success of a home exercise program. Success in application of lower extremity bracing for advanced dystrophy is dependent on correct timing and shows an important correlation with the extent of contractures. Iliotibial band contracture appears to play an important role in joint contractures and deformity in muscular dystrophy, although little attention has been focused on its role in this disease. The occasional judicious use of surgery in the control of joint contracture and iliotibial band tightness offers promise of an accessory measure in controlling joint deformities.

9:15 **An Objective Method of Evaluating Hip Flexion Contracture.**

LEON M. ROTHMAN, M.D., Associate, Department of Physical Medicine and Rehabilitation, New York Medical College, New York City; Assistant Visiting Physician, Department of Physical Medicine and Rehabilitation, Bird S. Coler Hospital;

OTTO DEUTSCHBERGER, M.D. (by invitation), Assistant Clinical Professor in Radiology, New York Medical College, New York City; Executive Director, X-Ray Department, Bird S. Coler Hospital;

MILTON LOWENTHAL, M.D., Associate Professor, Department of Physical Medicine and Rehabilitation, New York Medical College, New York City; Visiting Physician, Department of Physical Medicine and Rehabilitation, Bird S. Coler Hospital; and

JOSEPH M. BREUER, M.A. (by invitation), Instructor, Geriatric Rehabilitation, New York Medical College; Clinical Instructor, Physical Therapy Students, New York University, New York City; Chief Physical Therapist, Bird S. Coler Hospital, Welfare Island, N. Y.

Flexion contracture at the hip joint is found as a complication in a wide variety of physical conditions encountered on a rehabilitation service. This complication is not an infrequent factor limiting the ambulation goals of the rehabilitation patient. The usual methods of estimating the presence and degree of hip flexion contracture by the eye alone or even with a goniometer are subject to considerable error. A technic of mensuration utilizing a lateral x-ray projection has yielded reproducible measurements with a high degree of accuracy. Fixed bony landmarks give origin to lines which when extended form an angle. The measurement of this angle gives an absolute figure which represents the relationship between the bony pelvis and the femur, and permits objective evaluation of the therapeutic effectiveness in dealing with limitation of hip extension.

9:30 **Pitfalls in the Diagnosis and Management of "Osteoarthritis" in Elderly Patients.**

IRVIN NEUFELD, M.D., Associate in Orthopedic Surgery, New York Medical College; Associate Visiting Orthopedic Surgeon, Metropolitan Medical Center, New York City, and Bird S. Coler Memorial Hospital, Welfare Island, N. Y.

"Osteoarthritis" in middle-aged and elderly patients frequently represents a radiologic rather than a clinical diagnosis. Frequently, the radiologic changes actually represent an asymptomatic osteophytosis while the actual clinical symptoms are due to some nonarthritic process in muscular, ligamentous, periarticular, tendinous, vascular, adipous, nervous, or fibrous structures. The recognition and proper evaluation of these syndromes enable the physiatrist to institute gratifying therapeutic measures while the "objective" radiologic findings remain unchanged or may even progress. The fallacies leading to the diagnosis of "osteoarthritis" and to the overlooking of the various soft tissue syndromes will be discussed.

9:45 **Relief of Arthritic Pain and the Rehabilitation of the Chronic Arthritic Patient by Extended Sympathetic Denervation.**

ROBERT HERFORT, M.D. (by invitation), Attending Surgeon, Grasslands Hospital, Valhalla; Associate Attending Surgeon, St. Agnes Hospital, White Plains, N. Y., and

S. HAROLD NICKERSON, M.D. (by invitation), Director of Orthopedics, St. Agnes Hospital, White Plains, N. Y.; Assistant Clinical Professor, Orthopedic Surgery, New York University-Bellevue College of Medicine; Attending Orthopedic Surgeon, Bellevue Hospital, New York City.

Pain arising in the weight-bearing joints is the major source of disability presented by most patients with chronic arthritis. The difficulty in alleviating joint pain, permanently and consistently, is the principal obstacle to the rehabilitation of these patients. During the past three years, the authors have employed a surgical technic of so-called extended lumbar sympathectomy in a group of some 12 unselected patients with advanced rheumatoid arthritis and osteoarthritis of the hip and/or knee joint. The operative procedure consists of an ipsilateral retroperitoneal lumbar sympathetic denervation encompassing the lumbar sympathetic trunk distal to the crus of the diaphragm, accessory sympathetic ganglia, and decussating fibers in the prevertebral lumbar plexus. The surgery, in this group of middle-aged and elderly patients, has had no morbidity and no mortality. In the immediate postoperative period, these patients exhibited remarkably effective, consistent, and lasting relief of joint pain with concomitant improvement in joint mobility and in general functional capacity. These patients have been followed for

periods up to three years postoperatively and, in all instances, the relief of joint pain and improved mobility have persisted. There have been no untoward effects noted in the follow-up period to date. Charcot arthropathy has not occurred nor is it anticipated.

INTERMISSION — INSPECTION OF EXHIBITS

10:30 **Kinesiology of the Temporomandibular Joint.**

SIDNEY I. SILVERMAN, D.D.S., Associate Clinical Professor, Department of Physical Medicine and Rehabilitation, New York Medical College, Metropolitan Hospital Center; Director, Post Graduate and Graduate Prosthodontics, New York University College of Dentistry; Consultant in Prosthodontia, VA Hospital, New York City.

A study of the kinesiology of the temporomandibular joint is discussed in relation to the functions of speech, respiration, mastication, deglutition, head posture and the special senses. It will include: cineradiographic observations of the temporomandibular joint and the pharyngeal musculature; electromyographic records of the muscles associated with joint movement; three dimensional studies of the functional and extreme ranges of movement of the joint; the neurophysiologic mechanisms and the psychologic components of the joint function. The study will discuss the therapeutic implications in the field of physical medicine and rehabilitation in relation to nutrition, speech retraining, body posture and the psychological well being of the patients. It will also discuss the similarity between the common clinical problems of temporomandibular joint pain syndrome and low back pain syndrome.

10:45 **Trochanteric Bursitis: Management.**

ROBERT M. KROUT, M.D., Department of Physical Medicine and Rehabilitation, Mary Hitchcock Memorial Hospital, and

THOMAS P. ANDERSON, M.D., Director of Department of Physical Medicine and Rehabilitation, Mary Hitchcock Memorial Hospital, Hanover, N. H.

A previous report by one of us (T.P.A.) presented the criteria for the diagnosis of chronic trochanteric bursitis of the hip. It was shown that in more than 50 per cent of the cases the bursitis is associated with some other painful condition in the same lower extremity or the back. An analysis of the methods of management of 50 cases of chronic trochanteric bursitis is presented. The various forms of treatment for the bursitis per se are compared. Special reference is made to the management of that group of cases in which the bursitis is associated with some other condition. Emphasis is placed on the necessity for correction of the associated situation as an integral part of the treatment of the bursitis. Several illustrative case histories are included.

11:00 **Use of Pulsed Short Wave in Treating Bursitis.**

ABRAHAM J. GINSBERG, M.D., Formerly Associate in Physical Medicine, The Hospital for Joint Diseases, New York City.

A report is given on the results of a 15-year study on patients with bursitis who received pulsed short wave treatment. Objective results of treatments to 50 patients with calcium deposits show over 80 per cent success. X-rays to demonstrate these results will be shown. Subjective results of treatments to more then 100 patients indicate 80 per cent of the patients were completely relieved. Continued clinical case history followups show 20 per cent of these patients indicated continued relief from recurrence of symptoms for periods as long as 15 years. In acute attacks, pain was usually relieved in the first week of treatment and completely disappeared in two weeks. Normal motion was restored in two to four weeks and calcium deposits, where known, disappeared in eight to ten weeks. The treatment, called Diapulse, consists of application of pulsed short wave electrical energy — more then 1300 watts of instantaneous power is available to the patient. The pulses are so timed that the elevation of temperature during the pulse is dissipated.

SCIENTIFIC FILMS

Assistive Devices for the Paralyzed Upper Extremity: *Color, sound, 10 minutes.*
Presented by William D. Loeser, M.D.

The Effects of Pulsed Short Wave Therapy: *Black and white, sound, 20 minutes.*
Presented by A. J. Ginsberg, M.D.

GENERAL SCIENTIFIC SESSION

TUESDAY, August 26 — 2 P.M.

Rose Garden

Presiding — DONALD L. ROSE, Kansas City, Kans.
Assisting — FRANCES BAKER, San Mateo, Calif.

OPENING OF THE THIRTY-SIXTH ANNUAL SESSION

INVOCATION

ADDRESSES OF WELCOME

2:15 **Presidential Address.**

DONALD L. ROSE, M.D., Chairman, Department of Physical Medicine, University of Kansas School of Medicine, Kansas City, Kans.

2:45 **Eighth John Stanley Coulter Lecture: Training and Fitness — Concepts and Problems in Rehabilitation.**

KARL HARPUDER, M.D., Columbia University, Department of Medicine; Albert Einstein College of Medicine, Department of Physical Medicine and Rehabilitation; Department of Physical Medicine and Rehabilitation, New York Medical College; Chief, Department of Physical Medicine and Rehabilitation, Montefiore Hospital, New York City; Senior Consultant, VA Hospital, Bronx, N. Y.

3:15 **Physical Medicine and Rehabilitation: Its Responsibility and Contributions to World Understanding.**

HOWARD A. RUSK, M.D., Professor and Chairman, Department of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center; Director, Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center; Chief, Physical Medicine and Rehabilitation Service, Bellevue Hospital, New York City.

Rehabilitation of disabled children and adults is an international language which transcends national ideological racial and linguistic barriers. It is one of America's sharpest tools for making friends. The world looks to the United States, as the international leader in physical medicine and rehabilitation, to assist it in sharing our knowledge through professional education of physicians and paramedical personnel throughout the world. This responsibility of the physiatrists of the United States has been greatly increased both by the political dangers of the current period and the rising incidence of physical disability throughout the world resulting from the prolongation of the life span. Never before, however, have the opportunities been so bright for us to meet this responsibility.

GENERAL SCIENTIFIC SESSION

WEDNESDAY, August 27 — 9 A.M.

Rose Garden

Presiding — HERMAN J. BEARZY, Dayton, Ohio
Assisting — HERMAN L. RUDOLPH, Reading, Pa.

9:00 **Clinical Indications for Electromyography.**

CHARLES A. FUREY, M.D., Professor and Head of Department of Physical Medicine and Rehabilitation, Hahnemann Medical College and Hospital, Philadelphia.

Electromyography yields valuable information regarding the neuromuscular system that cannot be obtained by any other laboratory procedure, nor detected by the trained eye of the clinician. There is frequently a question in the practitioner's mind as to whether an electromyogram is indicated or would be helpful in establishing the diagnosis in a particular case. It is therefore important that the clinical indications for conducting an electromyogram (EMG) be both clearly defined and brought to the attention of the medical profession. An electromyogram is indicated in the presence of atrophy, paralysis or weakness. Atrophy is first noted by the clinician while conducting his physical examination of the muscular system. Atrophy will be detected at an early stage if particular attention is given to the "muscular status" of the patient, including the volume and contour of the muscles. An electromyogram conducted at this point will aid in the frequent perplexing differential diagnosis of neuritic atrophy (involving a particular nerve), spinal atrophy (segmental distribution), muscular atrophy per se and local atrophy due to disease of the bone or joint. Weakness frequently causes the patient to consult his physician. Weakness may be the

result of one of a great variety of disorders of the upper-motor-neuron such as cerebral vascular accident, cranial neoplasm and the like or it may be a symptom of such lower-motor-neuron disorders as poliomyelitis, progressive spinal muscular atrophy or amyotrophic lateral sclerosis. In the presence of weakness the electromyogram assists in differentiating between upper and lower-motor-neuron disease. Furthermore, in cases wherein the weakness is due to lower-motor-neuron pathology, this procedure aids in localization of the lesion in the anterior horn cells, spinal nerve root, nerve plexus or the peripheral nerve. In still other cases wherein weakness is due to a primary muscular disorder such as amyotonia congenita, myotonia aquisita or myotonia atrophica, the electromyogram confirms the clinical diagnosis of such disorder. Today, electromyography clarifies diagnosis by differentiating a group of neuromuscular disorders that heretofore have been difficult diagnostic problems.

9:15 **Electromyographic Composition of Poliomyelitis Injured Muscle.**

ERNEST F. ADAMS, M.D., Department of Physical Medicine, Georgia Warm Springs Foundation; Department of Physical Medicine, Emory University; Physician, Georgia Warm Springs Foundation, and

G. CLINTON KNOWLTON, Ph.D. (by invitation), Director, Research Laboratory, Georgia Warm Springs Foundation, Warm Springs, Ga.

This paper reports the results of an electromyographic survey of 120 poliomyelitis injured muscles. The subject muscles were evenly distributed through the Lovett grades from zero to G or better. The incidence of fibrillation, voluntary polyphasic units, normal contour motor units and silence has been tabulated on the basis of a sixty point examination of each muscle. The incidence pattern of these electromyographic features in relation to muscle grade will be described and the significance of these findings to diagnosis, prognosis and treatment will be discussed.

9:30 **Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration. Part II: Expiration.**

ALMA J. MURPHY, Ph.D. (by invitation), Research Associate, Department of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan and University Hospital;

GEORGE H. KOEPKE, M.D., Associate Professor of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan and University Hospital;

EDWIN M. SMITH, M.D., Instructor, Department of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan and University Hospital, and

DAVID G. DICKINSON, M.D. (by invitation), Associate Professor of Pediatrics, University of Michigan; Medical Director, Poliomyelitis Respirator Center, Ann Arbor, Mich.

Previous electromyographic observations in this laboratory have indicated that the first intercostal muscle and diaphragm were used in quiet breathing and that subsequent intercostal muscles were serially recruited with deeper breathing. The present investigation has been made of the sequence of action of the diaphragm and intercostal muscles during forced exhalation of measured volumes from various intervals of the respiratory cycle. The activity of the muscles was recorded simultaneously by means of the multiple channel electromyograph using the multiple needle technic. Through the electronic recording devices, the measurements of the expiration volume were synchronized with the electromyographic activity of the respiratory muscles of normal men. The evidence indicates that during quiet or near tidal respiration, the exhalation phase may occur without electromyographic activity. But, during deeper respirations, a forced exhalation requires muscle activity that appears to show recruitment of the lower intercostals followed by the upper intercostal muscles.

9:45 **Study of the Effect of Temperature on the Conduction Speed in Ulnar Nerve.**

KARL OLSEN, M.D. (by invitation), College of Medicine, Ohio State University;

RICHARD W. STOW, Ph.D., M.D. (by invitation), Assistant Professor, Department of Medicine, Section of Physical Medicine, College of Medicine, Ohio State University, and

H. GUYETTE, M.D. (by invitation), College of Medicine, Ohio State University, Columbus, Ohio.

The conduction speed of the forearm portion of the ulnar nerve was measured in approximately 10 normal subjects, under varying temperature conditions. A needle thermistor in the flexor carpi ulnaris measured the temperature variations produced by general body heating and cooling. By avoiding local heating it was thought that temperature changes in the muscle, at the average depth of the ulnar nerve, would more nearly represent changes in temperature of nerve substance. Temperature variations account for a significant fraction of the variations in conduction speed in the normal population.

INTERMISSION — INSPECTION OF EXHIBITS

10:30 **Neurotripsy: A Surgical Method for Instigating Reinnervation of Diaphragmatic Paretic Muscle Fibers in Respiratory Embarrassment Following Poliomyelitis.**

HARVEY E. BILLIG, JR., M.D., Medical Director, The Billig Clinic, Los Angeles.

In poliomyelitis, residual respiratory embarrassment may be the result of loss of a sufficient share of the motor nerve axons of the phrenic nerves reducing the innervated diaphragmatic muscle fibers to below the point of providing sufficient power to aerate the lung properly. The denervated muscle fibers (about 125 per motor nerve axon) do not necessarily degenerate, but atrophy, and are capable of restoration to function if reinnervated by increased arborization of the residual intact motor nerve axons. A means for instigating increased arborization of the remaining intact motor nerve axons is presented, together with two illustrative case histories in which this has successfully been accomplished.

10:45 **Oral Intermittent Positive Pressure Breathing (OIPPB) in Poliomyelitis.**

WILLIAM D. LOESER, M.D., Associate, Department of Medicine, University of Buffalo School of Medicine; Medical Director, Respiratory and Rehabilitation Center of the University of Buffalo Chronic Disease Research Institute, and

MARIAN F. KERR, R.P.T. (by invitation), Assistant in Physical Therapy, Program in Physical Therapy, University of Buffalo; Chief and Research Physical Therapist, Respiratory and Rehabilitation Center of the University of Buffalo Chronic Disease Research Institute, Buffalo.

A new manner of artificial ventilation is described in which filtered air is intermittently pumped to the patient's mouth using a hose and pipe-stem mouthpiece. This has several advantages over conventional methods of mechanical artificial ventilation for the convalescent poliomyelitis patient e.g., self-regulation of tidal volume, partial self-regulation of rate, improved accessibility for nursing care, freedom from shell and tank encumbrances, less hindrance to standing and walking, and preservation of rib cage mobility through maintenance of normal respiratory excursions. Thus, OIPPB has proved useful for both artificial ventilation and physical therapy. As with other positive pressure methods, OIPPB may affect the peripheral circulation by elevating intrapleural, right atrial and systemic venous pressure. The over-all advantages of OIPPB have been demonstrated in 34 poliomyelitis patients requiring respiratory assistance; two case reports are given.

11:00 **Studies of the Disturbance of Longitudinal Bone Growth Following Anterior Poliomyelitis.**

FREDERIC J. KOTTKE, Ph.D., M.D., University of Minnesota, The Medical School, Department of Physical Medicine and Rehabilitation; Professor and Head, Department of Physical Medicine and Rehabilitation, and

GLENN GULLICKSON, JR., M.D., University of Minnesota, The Medical School, Department of Physical Medicine and Rehabilitation; Assistant Director of Rehabilitation Center, Minneapolis.

Studies of the rate of growth of the long bones of the lower extremities have been conducted on 32 patients who had paralytic poliomyelitis involving one lower extremity primarily. Muscular strength, soft tissue mass, range of motion of the joints, posture, gait, and use of braces, crutches or canes were recorded. X-ray measurements of the bones of the lower extremities were made at intervals over a six-year period of time. The rate of growth of the involved lower extremity was compared with the rate of growth in the uninvolved extremity. Comparisons of the relative rates of growth were made during intervals when patients were receiving no medication and during the intervals when sympatholytic drugs were taken regularly. The influence of activity, limitation of motion and the use of braces are considered in evaluating the relative rates of bone growth. A relationship was found between sympathetic activity and the rate of longitudinal growth of bone which appears to have its influence through the control of the circulation to the extremity.

SCIENTIFIC FILM

Use of Resistive Exercises in Gait Training: *Color, silent, 25 minutes.*

Presented by O. Leonard Huddleston, Ph.D., M.D.

GENERAL SCIENTIFIC SESSION

WEDNESDAY, August 27 — 9 A.M.

Burgundy Room

Presiding — MORTON HOBERMAN, New York City
Assisting — ODON F. VON WERSSOWETZ, Gonzales, Texas

9:00 **Rehabilitation Survey and Demonstration of Greater Kansas City: An Interim Report.**

EDWARD B. SHIRES, M.D., Assistant Professor of Physical Medicine and Rehabilitation, University of Kansas Medical School; Assistant Director, Department of Physical Medicine and Rehabilitation, University of Kansas Medical Center, Kansas City, Kans.; Medical Director, Rehabilitation Institute, Kansas City, Mo., and

WARREN PETERSON, Ph.D. (by invitation), Project Director of the Rehabilitation Survey and Demonstration of Greater Kansas City (conducted by Community Studies, Inc.), Mo.

At the present time this survey is partially completed and much information has been collected to the beginning of the treatment program. This information which pertains to the diagnostic, psychological and social aspects of the rehabilitation problem in the Greater Kansas City area will be presented. A report will be included concerning the progress of the obesity program as well as the occupational training program for the mentally retarded and seriously handicapped. Some case reports will be included in an attempt to demonstrate the methodology used in approaching this problem in this project.

9:15 **An Evaluation of Rehabilitation of Patients with Hemiparesis or Hemiplegia Due to Cerebral Vascular Disease.**

JOHN UNTEREKER, M.D. (by invitation), Clinical Instructor, Department of Physical Medicine and Rehabilitation, New York University College of Medicine;

PHILIP R. LEE, M.D. (by invitation), Assistant Professor, Clinical Physical Medicine and Rehabilitation, Department of Physical Medicine and Rehabilitation, New York University College of Medicine;

HOWARD A. RUSK, M.D., Professor and Chairman, Department of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center; Director, Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center; Chief, Physical Medicine and Rehabilitation Service, Bellevue Hospital;

SIGMUND GROCH, M.D. (by invitation), Research Associate, Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center;

DANIEL J. DANIEL, M.D. (by invitation), Assistant Professor of Physical Medicine and Rehabilitation, Department of Physical Medicine and Rehabilitation, New York University College of Medicine, and

JOHN E. SILSON, M.D., M.P.H. (by invitation), Lecturer in Preventive Medicine and Biostatistics, School of Public Health and Administration, Columbia University; Lecturer in Preventive Medicine and Biostatistics, New York Medical College, New York City.

This report is an analysis of 230 cases of hemiplegia including a detailed followup of 85 treated at Bellevue Hospital. The purpose of the study was to determine the degree of success of rehabilitation with this group and to analyze how and why success or failure had been attained. Fifty-four per cent of the patients were male, and 46 per cent were female. The mean age was 58 years. Fifty-four per cent had a right-sided paralysis and 46 per cent had a left-sided paralysis. Forty-one per cent were aphasic and of these, the condition was severe in 40 per cent. Following rehabilitation, 90 per cent were discharged home from the hospital, and ten per cent remained hospitalized or were transferred to custodial settings. Eighty-five per cent were capable of some degree of ambulation; 50 per cent required the use of a leg brace and cane. In the follow-up study of 85 cases, 53 per cent had been employable at time of hospital discharge; 48 per cent remained so at followup. The factors which seemed most important in determining success of rehabilitation were an age of less than 65 years, a cooperative family and a well-motivated patient.

9:30 **Significance of Personality Traits in Rehabilitation Problems.**

MANUEL D. ZANE, M.D. (by invitation), Assistant Clinical Professor of Psychiatry, New York University College of Medicine, New York City.

In psychiatry, the development of personality traits as defenses against anxiety is widely accepted. In rehabilitation, personality traits often interfere with motor learning and create serious problems. This paper cites cases to show how personality traits interfere with motor learning; suggests a mechanism to explain the interference, and suggests management of the problem. Concrete methods for increasing the patient's reception of information during the task performance and reducing the interfering sensory-motor effects of the personality traits are discussed. Personality traits become a rehabilitation problem when they produce cortical effects which interfere with the progressive cortical reorganization that characterizes motor learning.

9:45 **Rehabilitation of Potentially Employable Homebound Adults.**

EDITH LIND KRISTELLER, M.D., Assistant Clinical Professor, Department of Physical Medicine and Rehabilitation, New York University, College of Medicine; Chief, Rehabilitation Ward Section, New York VA Hospital;

HARRY KATZ, M.A. (by invitation), Supervisor of Homebound and Amputee Unit of the N. Y. State Division of Vocational Rehabilitation, New York State Education Department, and

LEO L. STEIN, Ph.D. (by invitation), Instructor, New York University-Bellevue College of Medicine, Department of Physical Medicine and Rehabilitation; Senior Rehabilitation Counselor, Department of Physical Medicine and Rehabilitation, Bellevue Hospital, New York City.

Twenty-five applicants accepted in series by the NYS Division of Vocational Rehabilitation for homebound employment were provided with comprehensive evaluation and treatment by a New York University-Bellevue Medical Center rehabilitation team to determine whether rehabilitation services could assist a significant proportion to improved function thereby enabling some to become non-homebound. This group, compared with itself before and after the evaluation-rehabilitation process, was likewise compared with the immediately preceding 25 accepted by the state agency as suitable for homework. Both groups were similar at initial evaluation. At followup, the previous group showed no significant improvement in the Activities of Daily Living, and all remained homebound. The present group had improved significantly at the .01 confidence level in several areas, with six employed outside of the home and three others in training for outside employment. At followup however, only 15 of the rehabilitation group were currently employed. Their combined earning rate was almost $22,000 annually as compared with no wage income initially.

INTERMISSION — INSPECTION OF EXHIBITS

10:30 **Vocational Evaluation by Work Sample Technic and its Dependence upon Medical Contributions.**

WILLIS C. GORTHY, C.E. (by invitation), Director, Institute for the Crippled and Disabled;

ROBERT C. DARLING, M.D., Professor of Physical Medicine and Rehabilitation, College of Physicians and Surgeons, Columbia University; Director, Physical Medicine and Rehabilitation Service, Presbyterian Hospital; Chairman, Medical Board, Institute for the Crippled and Disabled;

LUCILLE TSU PAI, M.D. (by invitation), Instructor, Columbia University; Assistant Medical Director, Institute for the Crippled and Disabled; Assistant Physician, Presbyterian Hospital, and

JAY O'BRIEN, M.A. (by invitation), Columbia University, Occupational Therapy Department; Pre-Vocational Training Director, Institute for the Crippled and Disabled, New York City.

After twenty years' experience, the Institute for the Crippled and Disabled has perfected a method of vocational evaluation which uses the job sample as the primary technic. Called the TOWER system which is the short title for "Testing, Orientation and Work Evaluation in Rehabilitation," it has been published for general use in rehabilitation agencies. Incorporating the TOWER system into a comprehensive rehabilitative process requires the active participation of the medical staff to assess the patient's physical limitations in terms of specific job areas; prescribe treatment leading to improved vocational performance; prescribe the limits of and regulate work tolerance; prescribe adaptive devices that will improve vocational potential, and, review specific vocational recommendations to consider their compatibility with the long-term health needs of the patient. This paper explains the fundamentals of the TOWER system and points up the necessity for active participation by the medical staff in its use. It also cites the results of the past five years with successful cases evaluated by this process and gives case illustrations to demonstrate the manner in which a well-organized system of evaluation can produce better results in terms of more realistic vocational goals.

10:45 **Status of the Pre-Vocational Unit.**

EUGENE B. NADLER, Ph.D. (by invitation), and MIECZYSLAW PESZCZYNSKI, M.D., Associate Professor of Clinical Physical Medicine, School of Medicine, Western Reserve University; Chief, Department of Physical Medicine and Rehabilitation, Highland View Hospital, Cleveland.

Review of the literature on the pre-vocational unit reveals considerable debate regarding its functions and the personnel qualified to administer it. Amid the confusion, however, proponents of the various points of view agree that it consists mainly of actual work tasks selected from jobs which the disabled patient conceivably might enter. These tasks are usually, but not always, administered to the patient by occupational therapists. In its actual operation, the pre-vocational unit has had two major functions — therapy, to improve work tolerance and readiness, and evaluation to assess work skills, attitudes and performance. We suggest that much of the current debate in the literature would be resolved if the pre-vocational unit, in its therapeutic and evaluative aspects, were subjected to systematic, controlled study. Current research in psychological, vocational, and dexterity testing holds promise of isolating most of the factors which presently operate in pre-vocational performance. As evaluation, the pre-vocational unit would no longer be required. From the therapeutic viewpoint, pre-vocational prescriptions could be written that would proceed from tested therapeutic methods. Thus, pre-vocational therapy would return to its proper place, the occupational therapy center.

SCIENTIFIC FILM

Juvenile Amputees: *Color, sound, 30 minutes.*
Presented by Edward T. Haslam, M.D.

GENERAL SCIENTIFIC SESSION

WEDNESDAY, August 27 — 2 P.M.

Rose Garden

Presiding — ROBERT C. DARLING, New York City
Assisting — CONSTANTINE G. PSAKI, Philadelphia

2:00 **Acute Cerebrovascular Accidents: Statistical Consideration, Diagnostic Methods and Treatment.**

JOHN RIISHEDE, M.D. (by invitation), Chief Resident, Department of Neurosurgery, University Hospital, and

E. SCHACK STAFFELDT, M.D. (by invitation), Chief Resident, Department of Physical Medicine and Rehabilitation, University Hospital, Aarhus, Denmark.

Cerebrovascular disease is of growing concern to the general practitioner as well as to the staff members of the hospitals. Apoplexy is the third most frequent cause of death in the USA as in Denmark, outranked only by heart disease and cancer. Medical statistics show that in Denmark, a steep increase in deaths from cerebrovascular accidents has occurred since 1943, and that the increase affects all age groups over 45 years. Cerebrovascular accident is a neurological syndrome, not a disease per se, and the underlying causes can not be ascertained adequately by usual clinical methods. Since 1951 carotid angiography has been introduced into the routine examinations of more than 200 patients with acute cerebrovascular accidents admitted to the Department of Neurosurgery, University Hospital in Aarhus, Denmark. Details of technic and complications encountered will be described. Neurosurgical procedures (evacuation of intracerebral hematomas) are briefly mentioned. Treatment prescribed and administered by the Department of Neurosurgery is outlined.

2:15 *Panel Discussion:* **Rehabilitation of the Cardiac Patient.**
Participants to be announced.

GENERAL SCIENTIFIC SESSION

THURSDAY, August 28 — 9 A.M.

Rose Garden

Presiding — DONALD J. ERICKSON, Rochester, Minn.
Assisting — JOSEPH N. SCHAEFFER, Detroit

9:00 **Ontogenetic Study of Ankle Plantar Flexion Force.**

WILLIS C. BEASLEY, Ph.D. (by invitation), Consulting Staff, Department of Physical Medicine, Children's Hospital, Washington, D. C.; Director, Biophysics Research Laboratory, Bethesda, Md.

Methods employed clinically for evaluating strength of ankle plantar flexion muscles are notoriously useless. The tiptoe test, although objective, applies to only one very narrow range in the extremely extensive levels of force exhibited by this muscle group. If a patient passes this test, one does not know where the actual strength level is relative to normal. If the patient fails, one cannot estimate where the strength is located in the wide range between 'fair' and 'zero.' The present study is based upon quantitative tests given to some 1,500 presumably normal subjects drawn from the general population, and ranging in age from 5 to 70 years, including nearly equal representation of both sexes. From a thorough statistical analysis of these data, the relative importance of age, sex, body weight, height, and other anthropometric factors associated with the force measurements is revealed. A standardized scale for evaluating quantitatively the 'percentage of normal' status of an individual was derived from the measurements. In addition, the distribution of paresis shown among nearly 900 assorted post-poliomyelitis patients, ranging in age from 5 to 40 years, is evaluated by employing the quantified 'percentage of normal' scale. Some distinctly important findings will be reported.

9:15 **Threshold Muscular Fatigue Level and Strength Decrement Recovery of Elbow Flexor Muscles Resulting from Varying Degrees of Muscular Work.**

PAUL J. PASTOR, Ed.D. (by invitation), Fresno Junior College, General Education Division, Fresno, Calif.

The purposes of this study were to determine the threshold muscular fatigue level from elbow flexion ergographic exercise under optimum work output conditions and the rate of strength recovery following various amounts of fatiguing exercise of the elbow flexor muscles. Fourteen situations were studied, ranging from strength testing only through exhaustive ergographic exercise. The strength decrements 30 seconds after exercise were not statistically significant until the ergographic situation of nine repetitions was reached, so this amount of exercise was considered the threshold level. Greater consistency in recovery curves resulted as the number of repetitions increased. The number of contractions by the subjects in exhaustion testing was appreciably less than for those who were assigned 35 and 40 repetitions. One explanation could be the difference in motivation between an assigned number of repetitions to complete and a voluntary exhaustive exercise situation.

9:30 **Further Studies on Brief Isometric Exercises.**

W. THEODORE LIBERSON, M.D., Chief, Department of Physical Medicine and Rehabilitation, State of Connecticut Veterans Home and Hospital, and

MORDECHAI M. ASA, M.D. (by invitation), Physical Medicine Research Associate, State of Connecticut Veterans Home and Hospital, Rocky Hill, Conn.

Effectiveness of daily brief (6 second) isometric exercises as compared with the DeLorme exercises was investigated in 26 normal individuals (hypothenar eminence was exercised). It was found that these exercises produce increase in strength and endurance more rapidly than the DeLorme type of exercise. Additional increase in strength and particularly endurance was found, however, when 6 second brief isometric exercises were repeated several times a day. No contralateral effects are observed. The results were confirmed by a direct recording of the muscle contractions produced by electrical stimuli prior to and after training. Repeated brief isometric exercises were applied to patients with lower motor neuron lesions with satisfactory results. The significance of these findings will be discussed.

9:45 **Use of Celastic in Temporary Bracing in Peripheral Nerve Injuries.**

ISRAEL MUSS, M.D., Chief, Physical Medicine and Rehabilitation Department, VA Hospital, and

NANCY LAMPORT, O.T. (by invitation), VA Hospital, Louisville, Ky.

Use of celastic for the fabrication of temporary bracing represents an effective method of treatment in physical medicine. Cases of peripheral nerve injury involving the radial, median, and ulnar nerve, (alone or in combination) can be fitted with a celastic splint for proper positioning. Temporary splints can also be adopted to paretic extremities, including foot drop following paraplegia or peripheral nerve involvement. The celastic also adopts itself to the temporary fabrication of pylons in the upper extremity to which may be affixed tools for the retraining of function. The use of the temporary splint or brace in no way takes the place of regular bracing or splinting but merely acts as a stop-gap during the acute period. During the time the permanent brace is being fabricated, which in many instances requires several weeks, the celastic splint prevents overstretching of a part or fibrosis and fixation of a joint.

INTERMISSION — INSPECTION OF EXHIBITS

10:30 **An Analysis of the Rehabilitation Needs and Prognoses of 232 Cases of Cerebrovascular Accident.**

MILTON LOWENTHAL, M.D., Associate Professor, New York Medical College, Department of Physical Medicine and Rehabilitation; Visiting Physician, Department of Physical Medicine and Rehabilitation, Flower and Fifth Avenue Hospitals, Metropolitan and Bird S. Coler Hospital;

JEROME S. TOBIS, M.D., Professor, New York Medical College, Department of Physical Medicine and Rehabilitation; Director, Department of Physical Medicine and Rehabilitation, Flower and Fifth Avenue Hospitals, Metropolitan Hospital and Bird S. Coler Hospital, and

I. RAY HOWARD, M.D. (by invitation), Fellow and Instructor, New York Medical College, Department of Physical Medicine and Rehabilitation; Chief Resident, Metropolitan Hospital, Bird S. Coler Hospital, New York City.

Two hundred and thirty-two cases of cerebrovascular accident were admitted during a period of one year to a 1,000 bed municipal hospital. These cases represented four per cent of all medical admissions. They were evaluated and followed by the rehabilitation service. Descriptive material for the group includes analysis of such factors as age, sex, side of hemiplegia, mortality, previous episodes, etc. Physical and laboratory findings such as coma, incontinence, aphasia, blood pressure, muscle tone and cerebrospinal fluid are also reported. The analysis of rehabilitation prognosis in the patients who survived the incident indicates that the presence of a rehabilitation service in a general hospital may favorably influence functional recovery in the hemiplegic patient.

10:45 **Evaluation of Functional Capacities of Lower Extremities of Amputees with Peripheral Vascular Diseases.**

ALLEN S. RUSSEK, M.D., Associate Professor, Clinical Physical Medicine and Rehabilitation, New York University College of Medicine; Attending Physician, Physical Medicine and Rehabilitation, Institute of Physical Medicine and Rehabilitation, Bellevue Hospital; Director, Physical Medicine and Rehabilitation, Hospital for Joint Diseases, New York City.

There is an increasing number of amputations in older people for vascular insufficiency of the lower extremities. Those with diabetes are a special problem because of the short life expectancy of the remaining leg after the first amputation. The approach from a prosthetic standpoint is one which should be directed towards maintaining mobility of the patient as long as possible, whether single or double amputee. The present objective methods of evaluating circulation are not helpful in the interpretation of the functional capacity of individuals as amputees. A follow-up study of 1,000 amputees to determine practical criteria is being conducted and this is a preliminary report of this follow-up study.

11:00 **Some Recent Developments in Self-Care Training.**

O. LEONARD HUDDLESTON, Ph.D., M.D., Medical Director, California Rehabilitation Center, Santa Monica, Calif.; Clinical Professor of Physical Medicine, School of Medicine, University of Southern California, Los Angeles.

Some of the basic principles of neuromuscular re-education employing the principle of proprioceptive facilitation and reinforcement have been adapted to self-care training activities. These include some of the technics such as contraction-hold, contraction-relaxation, reversals, slow and rapid reciprocal motions activities, rhythmic stabilization, etc., which have been described and which have been incorporated in some of the self-care training activities. Illustrations of some of the technics of the methods employed in self-care training will be demonstrated.

SCIENTIFIC FILM

Progressive Ambulation: *Color, silent, 25 minutes.*
Presented by O. Leonard Huddleston, Ph.D., M.D.

GENERAL SCIENTIFIC SESSION

THURSDAY, August 28 — 9 A.M.

Burgundy Room

Presiding — SIDNEY LICHT, New Haven, Conn.
Assisting — RAY PIASKOSKI, Milwaukee

9:00 **Essentials of a Residency Program in Physical Medicine and Rehabilitation.**

ERNEST W. JOHNSON, M.D., Assistant Professor, Division of Physical Medicine and Rehabilitation, Department of Medicine, College of Medicine, Ohio State University;

RALPH E. WORDEN, M.D., Associate Professor and Head, Division of Physical Medicine and Rehabilitation, Department of Medicine, College of Medicine, Ohio State University, and

RICHARD D. BURK, M.D. (by invitation), Assistant Professor, Division of Physical Medicine and Rehabilitation, Department of Medicine, College of Medicine, Ohio State University, Columbus, Ohio.

In order that this specialty continue to grow it is imperative that the training programs for physicians specializing in physical medicine and rehabilitation be well organized and standardized, as well as comprehensive, covering training and experience in every aspect of the field. The essentials of this residency program and the advantages and disadvantages of such a program in a university setting are discussed. The present physical medicine and rehabilitation program at Ohio State University Health Center is described.

9:15 **Physical Medicine and Rehabilitation in Law-Science; Its Value in Personal Injury Problems and Medical-Legal Trial Technics.**

MAX K. NEWMAN, M.D., Medical Director, School of Occupational Therapy, Wayne State University; Director, Physical Medicine and Rehabilitation, Detroit Memorial and Sinai Hospitals, Detroit.

The field of physical medicine and rehabilitation, by virtue of its extensive employment of objective technics, in the disturbances of the neuromuscular skeletal system, and associated diseases which require objective functional evaluation, offers the field of Law-Science the greatest opportunity for clarifying its many problems. The experience of the physiatrist in the use of the diagnostic and therapeutic measures defined in the objective tests such as the activities of daily living, range of motion testing, mechanical and myometer muscle testing, and with the extensive use of electronic recording devices and diagnostic medicine, permits the formulation of accurate and demonstrable information for legal judgment. By means of such methods as electromyography, chronaximetry, oximetry, circulation time testing and the like, it is possible to clarify the criteria proof necessary to govern the just appraisal and disposition of the various personal injury claims. Appropriate examples are presented in developing the criteria of the objective disability, capability, and the methods of evaluation to demonstrate the actual application in trial technics.

9:30 **Some Medical-Legal Aspects of Physical Medicine and Rehabilitation.**

HERMAN WING, M.D., LL.B. (by invitation), Clinical Fellow, Physical Medicine and Rehabilitation, Massachusetts General Hospital, and

ARTHUR L. WATKINS, M.D., Assistant Clinical Professor of Medicine, Harvard Medical School; Chief of Physical Medicine, Massachusetts General Hospital, Boston.

This paper points out the ever growing interrelationships between law and the specialty of physical medicine and rehabilitation. It is divided into three parts: 1. A brief discussion of applicable features of medical jurisprudence; 2. liability and responsibilities of physicians and other personnel of the departments within hospitals as well as legal implications of procedures and equipment employed, and 3. the insurance aspects which deal with medical reports, cooperation with statutory and administrative bodies such as Workmen's Compensation Boards, Rehabilitation Commissions, etc., and the evaluation of physical disability for purposes of litigation, settlements, or testifying in courts.

9:45 **A Method for the Functional Evaluation of Disability.**

JACK SOKOLOW, M.D., Clinical Instructor, Department of Physical Medicine and Rehabilitation, NYU-Bellevue Medical Center, New York City; Director, Physical Medicine and Rehabilitation, Elmhurst General Hospital, Elmhurst, N. Y.;

HOWARD A. RUSK, M.D., Professor and Chairman, Department of Physical Medicine and Rehabilitation, NYU-Bellevue Medical Center; Director, Institute of Physical Medicine and Rehabilitation, NYU-Bellevue Medical Center;

EUGENE J. TAYLOR, M.A. (by invitation), Assistant Professor, Department of Physical Medicine and Rehabilitation, NYU-Bellevue Medical Center; EDWARD T. ANDERSON, M.A. (by invitation), Statistician, Department of Physical Medicine and Rehabilitation, NYU-Bellevue Medical Center, and

JOHN E. SILSON, M.D., M.P.H. (by invitation), Lecturer in Preventive Medicine and Biostatistics, School of Public Health and Administration, Columbia University; Lecturer in Preventive Medicine and Biostatistics, New York Medical College, New York City.

The need for an objective method of evaluating disability has become more pressing with the advance of rehabilitation and the passage of legislation of the "disability freeze" type. With systems now in use, it is conceivable that a person might be considered disabled in one state and yet be rehabilitated and selectively placed in a job in another state. This project was undertaken to develop a uniform system of classifying the physical, emotional, social, and vocational capacities of disabled

individuals functionally. A tentative classification system has thus been devised embracing the physical, social, emotional, and vocational spheres, and which permits broad application but also detailed expansion where desirable. Data from the forms are punched on I.B.M. cards. These forms have been pilot tested on 100 patients in various stages of rehabilitation at several institutions to determine inadequacies and necessary revisions. Forms will be shown and their use explained. Plans for the next two years are discussed.

INTERMISSION — INSPECTION OF EXHIBITS

10:30 **Rehabilitation of the Paraplegic: A Study of 100 Cases.**

RACHEL F. WEEMS, M.D., Director, Physical Medicine and Rehabilitation, Woodrow Wilson Rehabilitation Center, Fishersville, Va.

This study of 100 paraplegics treated at the Woodrow Wilson Rehabilitation Center in 1957 includes the age, sex, level of the lesion, and the cause of the paraplegia, since they are related to other items considered. Because the majority needed a new vocational objective, a brief discussion is given of the procedures in vocational diagnosis. The effect of the time interval between the onset of the paraplegia and admission to the Center on the progress of the student in therapy and in vocational training is evaluated, as well as the effects of medical and surgical problems. Comparisons are made as to the progress and time required for completion of the vocational training programs between paraplegics and non-paraplegics, and between paraplegics who had their physical restoration program prior to vocational training, and those who had vocational training and therapy programs running concurrently. Since the majority of the paraplegics are found in business, watch repair, general mechanics, and furniture refinishing, these courses only are used in the comparisons.

10:45 **The Pressure Sore: Prevention and Treatment As An Aid to Rehabilitation.**

J. TREACY O'HANLAN, M.D. (by invitation), Consultant in Surgery, Woodrow Wilson Rehabilitation Center, Fishersville, Va.; Surgeon, Waynesboro Community Hospital, Waynesboro, Va.; Surgeon, King's Daughters' Hospital, Staunton, Va.

In the past eight years over 800 paraplegics have been rehabilitated at the Woodrow Wilson Rehabilitation Center. Paraplegic pressure sores are the one main cause of a breakdown in the rehabilitation program. Prevention of these ulcerations is of prime importance if rehabilitation time and dollars are to be protected. Gluteal pressure sores are the most common ulceration seen, since sitting is the position of function of the paraplegics. Strict wheelchair discipline is enforced and all paraplegics are required to do "push-ups" to reoxygenate the skin of the buttocks. The Woodrow Wilson Cut-Out Board is also used as it transfers the sitting pressure from the ischial tuberosities to the posterior aspect of the femurs. This reduces pressure by a factor of 10. Radical surgery is used when the ulcers involve the skin, burse and bone. Resection of the ischial bone from the lesser sciatic notch to the pubis is indicated when the ischial tuberosity is exposed. Only 30 days' convalescence is needed before the rehabilitation program is resumed. Resection of the greater trochanter, or even the head of the femur without amputation of the limb, is used to correct large ulcerations of either or both hips. Excision of the ulcer, lower sacrum and coccyx will allow primary closure on many sacral ulcerations. Preventive treatment, however, is still the best form of therapy.

11:00 **Analysis of a Dramatic Picture. Occurrence of a Knee Injury in Professional Football.**

WILLIAM NEILL, III, B.A., R.P.T. (by invitation), Assistant Trainer, Baltimore Colts; Clinical Supervisor, University of Maryland, School of Physical Therapy; Chief Physical Therapist, Kernan Hospital for Crippled Children, and

EDWARD BLOCK, Ed.D., R.P.T. (by invitation), Head Trainer, Baltimore Colts Professional Football Team; Assistant Clinical Supervisor; Assistant Chief Physical Therapist, Kernan Hospital for Crippled Children, Baltimore.

This study is based on a remarkable photograph which was taken just at the instant a professional football player was tackled during a game with resultant injury to his knee joint. The picture is of unusual clarity permitting unobstructed detail analysis. The photograph depicts the classical mechanics of the most common athletic knee joint injury. Slides have been made of different portions of the photograph isolating the action of the various forces. The motion picture of this injury was also obtained, and by joining the ends of the strips of film, thereby creating a circle, the action can be studied indefinitely. The film strip can also be studied a frame at a time. A detailed analysis of the slides of the various portions of the photograph and of the motion picture will be presented. A report of the operative findings at time of surgery will also be presented. Methods of preventing such injuries will be discussed briefly.

SCIENTIFIC FILM

Neurotripsy: *Color, silent, 15 minutes.*
Presented by Harvey E. Billig, Jr., M.D.

GENERAL SCIENTIFIC SESSION

THURSDAY, August 28 — 2 P.M.

Burgundy Room

Presiding — EVERILL W. FOWLKS, Portland, Ore.
Assisting — G. KEITH STILLWELL, Rochester, Minn.

2:00 **Referred Phenomena. Their Diagnostic and Therapeutic Significance from a Physiatric Standpoint.**

IRVIN NEUFELD, M.D., Associate in Orthopedic Surgery, New York Medical College; Associate Visiting Orthopedic Surgeon, Metropolitan Medical Center and Bird S. Coler Memorial Hospital, New York City.

Adequate empirical, theoretical, and experimental evidence of the clinical importance of referred phenomena is available. There is also sufficient theoretical and experimental knowledge in this field to differentiate between significant scientific facts and exaggerated claims. The various types and forms of referred phenomena that are of differential-diagnostic and therapeutic importance to the physiatrist will be discussed critically. Illustrative case histories will also be presented.

2:15 *Panel Discussion:* **Head, Neck and Arm Symptoms Subsequent to Neck Injuries.**

DONALD J. ERICKSON, M.D., Mayo Clinic, Rochester, Minn., Moderator

SURGICAL ANATOMY: James J. Morrow, M.D. (by invitation), North Hollywood, Calif.

ROENTGENOLOGICAL ASPECTS: Martin Abel, M.D. (by invitation), San Francisco.

RANGES OF MOBILITY: Frederic J. Kottke, M.D., Minneapolis.

SPECIAL ORTHOPEDIC DIAGNOSTIC AND THERAPEUTIC CONSIDERATIONS: Harvey E. Billig, Jr., M.D., Los Angeles.

PHYSICAL THERAPEUTIC CONSIDERATIONS: David Rubin, M.D., Los Angeles.

THE STRUCTURAL INJURIES: Ruth Jackson, M.D. (by invitation), Dallas, Texas.

GENERAL SCIENTIFIC SESSION

FRIDAY, August 29 — 9 A.M.

Burgundy Room

Presiding — FRED B. MOOR, Los Angeles
Assisting — REX O. McMORRIS, Louisville, Ky.

9:00 **A Successful Physical Medicine Bed Service in a General Medical and Surgical Hospital.**

DONALD R. ADAMS, M.D., Chief, Physical Medicine and Rehabilitation, VA Hospital, Muskogee, Okla.

A successful bed service depends on local PM&R climate and physical location of the proposed service in relation to the clinics; calls for selection of patients with good rehabilitation potential for transfer to the specialized bed service and the privilege of retransfer to the medical or surgical service of errors in selection of poor rehabilitation risks. To make full use of the therapists' knowledge, judgment and abilities in initial patient selection and a day-to-day recognition of progress and the attaining of therapeutic plateaus and point of maximum treatment benefit should be determined. This paper presents statistics on types of rehabilitation cases, turnover rate and patient age levels tabulated over a six-month successful operation.

9:15 **A Practical Mobilization Physical Medicine Program for Control of the Industrial Backache.**

HARVEY E. BILLIG, JR., M.D., Medical Director, The Billig Clinic, Los Angeles, and

GEORGE HASSARD, M.D. (by invitation), Medical Director, Owens-Illinois Glass Company, Alton, Ill.

A brief historical review of the major approaches to the understanding of the mechanics of back injuries, particularly those following strains is recapitulated. Results of a mobilization program as applied in various industries are analyzed and summarized. A detailed analysis of the connective tissue mobilization program experience at the Owens-Illinois Glass Company plant in Alton, Illinois, for the correction of the industrial backache is statistically presented to include work hours saved including a breakdown of cost analysis.

9:30 **Polarized Air: An Adjunct in the Treatment of Burns.**

THEODORE A. DAVID, M.D. (by invitation), Associate in Surgery, Northeastern Hospital of Philadelphia;

JOHN R. MINEHART, M.D. (by invitation), Instructor in Surgery and Surgical Anatomy, Temple University School of Medicine; Chief of Surgery, Northeastern Hospital of Philadelphia, and

IGHO H. KORNBLUEH, M.D., Associate in Physical Medicine and Rehabilitation, Graduate School of Medicine, University of Pennsylvania; Medical Director, Department of Physical Medicine and Rehabilitation, Graduate Hospital, University of Pennsylvania, Philadelphia.

The sedating, desiccating, and deodorizing effects of artificially ionized air proved valuable in the treatment of painful thermal and chemical burns. A definite pain-controlling quality of negative ionization was observed in burns of all degrees. The need for narcotics and sedatives was reduced to a minimum and in many cases was completely absent already after the first treatment. The favorable local and systemic response of burned patients to ionization induced the authors to adopt this method for routine treatment of all burns. While the medical and surgical emergency measures remain essentially unchanged it appears that with the aid of artificial ionization the long morbidity is shortened. House patients are exposed individually to negative ionization. The available facilities permit simultaneous treatment of six ambulatory patients. With minor adjustments this method could be easily and inexpensively adapted to permit exposure of large groups of persons to therapeutically effective air ion levels. The importance of this adjunctive therapy of burns in the event of mass disaster must be stressed.

9:45 **Physiologic and Psychologic Effects of Cold Wet Sheet Envelopment ("Packs").**

JACK MEISLIN, M.D., Chief, Physical Medicine and Rehabilitation Service, VA Hospital, Montrose, N. Y.; Assistant Clinical Professor, Rehabilitation Service, Albert Einstein Medical College, Yeshiva University; Special Lecturer, Department of Physical Therapy, College of Physicians and Surgeons, Columbia University;

JEROME L. SINGER, Ph.D. (by invitation), Research Associate, Institute of Psychological Research, Teachers College, Columbia University, New York City, and

HENRY STANO, B.S. (by invitation), Chief Physical Therapist, VA Hospital, Montrose, N. Y.

With recent advances in the management of psychiatric patients and the advent of tranquilizing drugs, the role of sedative hydrotherapy in the form of cold wet sheet envelopment (commonly referred to as "cold wet sheet packs") has reached its lowest ebb. In some psychiatric hospitals it has been completely eliminated. Nevertheless, the authors believe that in selected patients properly administered cold wet sheet envelopment can make an important therapeutic contribution. In spite of the fact that hydrotherapy has been utilized for almost a century in our psychiatric hospitals, there is a conspicuous paucity of controlled studies of physiologic and psychologic effects of cold wet sheet envelopment. In this pilot work, 15 subjects and 15 controls were selected from a group of hospital employees and students. The subjects were enveloped in cold wet sheets while the controls were merely covered with a dry sheet. In addition to the evaluation of such physiologic functions as pulse, respiration, blood pressure, systemic temperature and skin temperature, the subjects and controls were given modified psychological tests before and at the conclusion of the testing situation. A record was made of other objective changes and subjective experiences. Among the significant results variations in the pulse rate and Rorschach movement responses were especially noteworthy.

10:00 **Iontophoresis Studies Using a Radioactive Tracer.**

HARRY T. ZANKEL, M.D., Associate in Rehabilitation, Duke University School of Medicine; Chief, Physical Medicine and Rehabilitation Service, VA Hospital;

ROBERT H. CRESS, M.D. (by invitation), Staff Physiatrist, VA Hospital, and

HENRY KAMIN, Ph.D. (by invitation), Assistant Professor of Biochemistry, Duke University School of Medicine; Principal Scientist, Radioisotope Service, VA Hospital, Durham, N. C.

This is a report on a program of research to determine the amount of radioactive substance absorbed during iontophoresis. The present work deals with ion transfer studies using radioactive iodine, with and without the application of heat and other modalities. Measurements are reported for skin absorption, and skin transmission as evidenced by tracer studies in 24 hour urine samples.

10:15 **Iontophoresis in Treatment of Dermatophytosis.**

EVERILL W. FOWLKS, M.D., Associate Clinical Professor of Physical Medicine, University of Oregon School of Medicine; Chief, Physical Medicine and Rehabilitation, VA Hospital, Portland, Ore.

The most common of fungus diseases is tinea pedis and its dermatophytid of the hands and other sensitized area of the skin. The chronic state caused by trichophyton purpureum in many cases becomes refractory to local treatments by chemical soaking and so-called fungicidal ointments and powders. X-radiation, full strength Whitfield's ointment, tincture of iodine, all have produced serious local reactions in acute dematomycosis and have in our experience contributed to formation of the "id" eruptions. The application of two per cent copper sulphate solution by iontophoresis has proved to be the treatment of choice in these refractory and widely involved cases. Typical cases of tinea pedis and tinea manus will be presented.

10:30 **Operation "Do It Yourself": A Self-Help Program Applied to Operation of the Physical Medicine and Rehabilitation Department.**

ROBERT A. SCHLESINGER, M.D., University of Pennsylvania School of Medicine, Department of Physical Medicine and Rehabilitation; Chief, Physical Medicine and Rehabilitation Service, VA Hospital;

NORMAN SCHRECK, M.A., R.P.T. (by invitation), Chief, Physical Therapy, VA Hospital, and

BERNICE B. MOSS, O.T.R. (by invitation), Chief Occupational Therapist, VA Hospital, Philadelphia.

The well-known rehabilitation philosophy of "making the most of what is available," together with the currently popular "do-it-yourself" trend, are here jointly applied to certain PM&R department operations to make available services and facilities otherwise unavailable because of prohibitive costs and restricted budgets. Details are given on design and fabrication of equipment for electromyography, muscle stimulation, intermittent traction, for patient self-care, and the utilization of substitute equipment originally designed for other purposes. A program for assuring continuous efficient operation of equipment is discussed. Described are constructional details for a practical electromyograph, AC and DC nerve-muscle stimulators for intensive therapy at home, an adaptation of a rocking bed to provide intermittent cervical traction, and a number of self fabricated devices for self-care. Technics for preprosthetic ambulation using substitute devices are described. Methods for equipment maintenance, trouble-shooting, and simple on-the-job service and repairs are given.

10:45 **The Rehabilitation Consultation.**

HERBERT W. PARK, M.D., Chairman and Professor, Department of Physical Medicine and Rehabilitation, Medical College of Virginia; Medical Coordinator of Patient Services, Medical College of Virginia Hospitals, Richmond, Va.

This paper is a study of the philosophy of medical consultation methods as related to the management of patients with long-term illness. Over the past five years the Baruch Center of Physical Medicine and Rehabilitation has been experimenting with various technics designed to serve the needs of the community. During this time several guidelines have become apparent. The most important has been the recognition that the family physician-patient relationship is of vital importance in the control of long-term illness. The consultation method discussed in this paper is designed to support and strengthen the bond between the physician and his patient.

SCIENTIFIC FILM

Biceps Cineplasty (Includes Operative Technic and Rehabilitation):
Color, sound, 45 minutes.
Presented by Robert A. Gregg, M.D.

SCIENTIFIC FILMS

TUESDAY, August 26 — 11:15 A.M.

Rose Garden

Methocarbamol (Robaxin) — A New Internueronal Blocking Agent:
Color, sound, 20 minutes.
Presented by Herbert W. Park, M.D.

The Use of Celastic in Temporary Bracing in Peripheral Nerve Injuries:
Color, silent, 15 minutes.
Presented by Israel Muss, M.D.

Burgundy Room

Assistive Devices for the Paralyzed Upper Extremity:
Color, sound, 10 minutes.
Presented by William D. Loeser, M.D.

The Effects of Pulsed Short Wave Therapy.
Black and white, sound, 20 minutes.
Presented by A. J. Ginsberg, M.D.

WEDNESDAY, August 27 — 11 A.M.

Rose Garden

Use of Resistive Exercises in Gait Training.
Color, silent, 25 minutes.
Presented by O. Leonard Huddleston, M.D.

Burgundy Room

Juvenile Amputees.
Color, sound, 30 minutes.
Presented by Edward T. Haslam, M.D.

SCIENTIFIC EXHIBITS

Liberty Mutual Insurance Company, "Industrial Amputee Rehabilitation." W. SCOTT ALLAN.

National Foundation for Infantile Paralysis, "Upper Extremity Bracing for Prevention — Correction — Function." RUTH AUSTIN.

Ontogenetics and Biomechanics of Ankle Plantar Flexion Forces. WILLIS C. BEASLEY, PH.D.

Absorption of Calcium in Bursitis by Means of Pulsed Short Wave Therapy. ABRAHAM J. GINSBERG, M.D.

Prosthetics Research Board of the National Academy of Sciences, "The Artificial Limb Program in the United States." HAROLD W. GLATTLY, M.D.

A Method of Attempting to Prevent Increasing Paralytic Spinal Curvature in the Growing Child. RAY A. HAAG, M.D.

The Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration. GEORGE H. KOEPKE, M.D.; JAMES W. RAE, JR., M.D., and DAVID G. DICKINSON, M.D.

Committee on Balneology and Health Resorts of the American Congress of Physical Medicine and Rehabilitation, "Balneotherapy Behind the Iron Curtain." IGHO HART KORNBLUEH, M.D.

Conditions and Deformities of Rheumatoid Arthritis. WILLIAM J. LA JOIE, M.D.

Steroid Injections in Trauma. EUGENE G. LIPOW, M.D.

Department of Health, Education and Welfare, "FDA Control of Devices and New Drugs." JOHN W. NESBITT, M.D. and ROBERT J. KENNEDY.

Control of Seizures and Hypertonus. MEYER A. PERLSTEIN, M.D.; HARRY ELAM, M.D.; and MARCOS TURNER, M.D.

Strike Back at Stroke: Early Mobilization of the Stroke Patient. PAUL Q. PETERSON, M.D.; S. D. POMRINSE, M.D.; and BERNARD D. DAITZ, PH.D., MSPH.

International Training in Physical Medicine and Rehabilitation. HOWARD A. RUSK, M.D. and DANIEL J. FELDMAN, M.D.

Rehabilitation of the Quadraplegic Patient. FRANK J. SCHAFFER, M.D.

American Board for Certification of the Prosthetic and Orthopedic Appliance Industry, Inc., "The Certified Orthotist-Prosthetist and the Physiatrist: A Report on Services and Training in the Artificial Limb and Brace Field." LESTER A. SMITH.

Vermont Rehabilitation Center. ROBERT P. SMITH, M.D.

Office of The Surgeon General, "Medical Education in the United States Army." FRANK M. TOWNSEND, COL. USAF (MC).

SUPPLEMENT

Papers listed here will be read by title. All papers in this group are to be submitted for publication in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

The Physiatrist and the American Scene.
KATHRYN J. McMORROW, M.D., M.P.H., Mt. Clemens, Mich.

Preparation for the Return of Neuropsychiatric Patient to Community Employment — An Intermediate Rehabilitation Program.
DELILAH RIEMER, M.D., Newton Centre, Mass.

Medical and Vocational Rehabilitation in a Community Workshop.
JACOB L. RUDD, M.D., Brockton, Mass., and
S. NORMAN FEINGOLD, Ed.D. (by invitation), Boston.

TECHNICAL EXHIBITS

AMERICAN WHEEL CHAIR DIVISION — Booth 35 INSTITUTIONAL INDUSTRIES, INC.

AMERICAN WHEEL CHAIR DIVISION will have on display representative models of its complete line of quality wheel chairs, walkers, get-about chairs, and commodes. The AMERICAN line includes wheel chairs with removable arms, interchangeable footrests and legrests, reclining backs, headrests, arm slings — and new developments in rehabilitation equipment. The new SCOTTIE wheel chair will be featured.

BRISTOL-MYERS PRODUCTS DIVISION — Booth 20

Bristol-Myers will feature AMMENS POWDER, a highly absorbent formulation containing zinc oxide, boric acid, hydroxyquinolin and talc dispersed in finely milled starch granules. Non-caking AMMENS furnishes ideal protection and comfort when used under casts, braces, orthopedic garments, and for dry massage. Also on hand: BUFFERIN and MINIT-RUB.

THE BURDICK CORP. — Booths 40 and 41

The Burdick Corporation will exhibit their modern line of electromedical equipment including conventional short wave and microwave diathermy, ultrasonic equipment, infra-red and ultraviolet lamps. Features of especial interest will be new models of ultrasonic, electrical stimulation and infra-red equipment.

S. H. CAMP AND CO. — Booth 36

The CAMP Company, celebrating their 50th Anniversary, have on exhibit in their booth 36 interesting new products, plus improved new design in their line of Supports and Appliances. You should acquaint yourself with the latest traction appliances, head, leg and pelvis; traction standard and extension apparatus. Braces and supporting garments of high quality that meet exacting requirements. Let their representative show and explain them to you. All are immediately available from your local Camp dealers.

CHATTANOOGA PHARMACAL CO., INC. — Booth 13

Welcome to the Hydrocollator Booth. We are anxious to see and talk to our many users. To those who are not using the Hydrocollator, do visit our booth and give us the opportunity to demonstrate this simple, convenient method of applying effective Moist Heat. All four Models of our Master Heating Units will be on display.

THE COCA-COLA CO. — Booth 29

Ice-cold Coca-Cola will be served through the courtesy and cooperation of The Philadelphia Coca-Cola Bottling Company, Philadelphia, and The Coca-Cola Company.

DALLONS LABORATORIES, INC. — Booth 4

This year Dallons will display all the new "Futura" lines for 1958, consisting of three new models of Medi-Sonar ultrasonic generators, two new Medi-Sine low volt therapy units, as well as a new Meditherm diathermy unit and the well-known Mediquartz ultraviolet lines. The "Futura" lines truly represent Physical Medicine equipment at its unsurpassed best, with advanced engineering and advanced design. You are cordially invited to visit our booth.

DIAPULSE MANUFACTURING CORP. OF AMERICA — Booth 28

"DIAPULSE" . . . A new Bio-electrical approach to the safe treatment of the whole patient! This revolutionary concept of medicine, researched and successfully applied for 25 years, makes available a dramatic therapy and treatment for a broad area of ailments and infections.

ELGIN EXERCISE APPLIANCE CO .— Booths 21 and 23

You are cordially invited to inspect THE ELGIN EXERCISE UNIT and other EXERCISE UNITS. These devices are specifically designed and developed in a scientific manner

to meet the many and varied problems of remedial exercise therapy. The doctor and physical therapist have available the proper clinical tools with which to administer a great variety of exercises to both the surgical and non-surgical patient. Simple functional exercises to the most highly definitive focal exercises may be performed with this equipment. Our representatives in attendance will be glad to supply literature and complete information.

JOHN N. ESCHEN CO., INC. — Booth 33

What's New in Prosthetics? "HYDRAULICS" . . . New light-weight unit that is unmatched for natural leg "feel" and action. Reduces fatigue, restores freedom of action, and betters living and well-being. "New Type Ischial-Weight bearing brace," fitted with split, "U.C." quadrilateral socket. We will gladly supply literature and complete information.

EVEREST & JENNINGS, INC. — Booths 17 and 19

Be sure and see the new Everest & Jennings hydraulic elevating wheelchair seat. It is the newest power assist for the handicapped patient from the world's leading manufacturer of wheelchairs and aids to the handicapped. Remember to get your free pencil and convention note book at the Everest & Jennings booth.

FASCOLE CORP. — Booth 8

Showing some of our many SELF-HELF DEVICES that will assist you in the REHABILITATION of your patients. Featuring DRESSING AND BATHING AIDS — EATING AND HOUSEKEEPING AIDS — CEREBRAL PALSY AIDS — SPECIAL CRUTCHES, CANES, etc., besides intimate personal necessities. See our "SHOPPING CENTER" catalog for complete REHABILITATION EQUIPMENT, and PLEASE register with us for our enlarged FALL-WINTER edition at booth 8.

R. A. FISCHER & CO. — Booth 22

Haber, Inc. (Distributors)

Visit our booth and see the latest in electro physical therapy equipment. Among the many modalities manufactured by FISCHER is the Model 3200 Ultra Sound which features surging, continuous, and impulse technics. Ask our representatives to demonstrate FISCHER equipment to you, and see for yourself the outstanding values we have to offer.

FRANKLIN HOSPITAL EQUIPMENT CORP. — Booths 25 and 26

Franklin Tilt Bed gives ease and comfort and provides treatment for patients too weak or ill to be transferred to a Tilt-Table for therapy treatment. The new Franklin Tilt-Bed provides for all of the standard hospital bed positions and adjustments, as well as the important features of tilt tables.

J. E. HANGER, INC. — Booth 31

Modern prosthetic devices for upper and lower extremity amputees will be displayed by the Hanger Organization who offer a complete service to the amputee. A representative will show you the Hanger Suction Socket Limb and the recent improvements for upper extremity prostheses.

ILLE ELECTRIC CORP. — Booths 9 and 11

HYDROMASSAGE SUBAQUA THERAPY EQUIPMENT. Ille Electric Corporation will demonstrate in exhibit spaces 9 and 11 how the care of infantile paralysis, arthritis, and other disabling conditions can be greatly improved by the use of Hydromassage Subaqua Therapy Tanks. They will display a Mobile Whirlpool Bath with Mobile Adjustable High Chair and Paraffin Bath. They will also display and demonstrate "MOISTAIRE" Heat Therapy Equipment.

LA BERNE MFG. CO., INC. — Booth 34

LaBerne Manufacturing Company will exhibit the following items of equipment: 1) Multi-Exerciser — a portable Resistive and Assistance Exerciser; 2) new type Parallel Bar — adjustable in height through a worm gear and mounted on platform, and 3) Hip Rotation Unit — for exercising pinned hips.

LIEBEL-FLARSHEIM CO. — Booth 27

See RITTER CO., INC.

M. J. MARKELL SHOE CO., INC. — Booth 16

We invite you to inspect our Tarso Supinator, Tarso Pronator and Tarso Medius shoes. We are one of the principal sources of children's prescription footwear, and our shoes have been in use throughout the country for 25 years. Tarso Shoes are available through reputable dealers in most cities and may also be obtained direct by qualified medical institutions.

MEDCO PRODUCTS CO. — Booth 39

Presenting the MEDCO-SONLATOR. Providing a new concept in therapy by combining muscle stimulation and ultrasound simultaneously through a SINGLE Three-Way Sound Applicator. The MEDCO-SONLATOR is a distinct advance in the effectiveness of physical therapy in your office or hospital. A few minutes spent in our booth will prove of value to your practice.

MEDCRAFT ELECTRONIC CORP. — Booth 24

MEDCRAFT ELECTRONIC CORP. will exhibit its Model M2 recording Electromyograph and its new portable Electromyograph. Technical personnel will be on hand to demonstrate the instruments and answer any questions concerning these units or the company's many other therapeutic, diagnostic, and laboratory instrument field.

THE MEDITRON CO. — Booth 10

ALL NEW — "Series M" Electromyographs by MEDITRON. NEW — A compact, portable combination EMG and CARDIOSCOPE. NEW MEDITRON MULTI-CHANNEL EXPANDABLE EMG. You can now purchase a basic MEDITRON EMG and later add low cost modular units for additional channels of EMG and EEG. NEW transistor MONITOR. A highly useful miniature audio electromyographic aid for muscle re-education. NEW nerve test equipment for TIME-CONDUCTION studies. NEW low noise, wide band pre-amplifiers in all MEDITRON EMGs. Band pass switches for EMG, EEG and EKG potentials. NEW Dual Channel (Stereophonic) tape recording facilities. NEW fool-proof photographic procedure.

MOORADIAN HIGH FREQUENCY LABS. — Booth 12

The Mooradian High Frequency Laboratories will show the well known Model "R" self-stabilized Short Wave Diathermy apparatus; a new type Modulated Current Low-Volt Generator; the Castroviejo Electro Surgical Ophthalmic Unit for Retinal Detachment and Cyclodiathermy; and an improved Cardiac Defibrillator of special construction and simple operation, the Columbia-Presbyterian Model.

THE C. V. MOSBY CO. — Booth 7

Featured among the Mosby Titles in booth 7 will be the following titles scheduled for 1958: Rusk "Rehabilitation Medicine"; Cowdry "The Care of the Geriatric Patient"; Patton "Pediatric Index"; Gardner "Diagnostic Anatomy." Other recently released titles are Kenney-Larson "Orthopedics for the General Practitioner"; Shands "Handbook of Orthopaedic Surgery"; Speed-Knight "Campbell's Operative Orthopedics"; Key-Conwell "Fractures, Dislocations and Sprains"; Haymaker "Bing's Local Diagnosis in Neurological Diseases"; Kranz "Kinesiology Manual"; Terry "Principles and Technics of Rehabilitation Nursing" and Scuderi "Atlas of Orthopedic Traction Procedures."

J. A. PRESTON CORP. — Booths 5 and 6

Welcome to our many friends. We are looking forward to greeting you at our exhibit. You will see an Electronic Oscillometer, the popular N-K Exercise Unit, the versatile Hausted Tractionaid, selected books, and many other products. PRESTON — Originators of a Complete Line for Physical Medicine and Rehabilitation — is always at your service. And your PRESTON CATALOG is your most complete and convenient ordering source for all your needs.

REHABILITATION PRODUCTS — Booths 1 and 2

(Division of American Hospital Supply Corp.)

Representative products from a complete line of PM&R equipment. Featured items: New TOMAC PLASTIC GONIOMETER — transparent with accurate double reading scale; MILLER TWISTER — a revolutionary Method of positive control of **any hip rotation problem;** TOMAC "ANKLE-ACTION" TRIPOD CANE; — Tomac Electrotherapy equipment; KEYSTONE SPLINT; SELF-HELP DEVICES — American Wheel Chairs. Whether you are building, enlarging, renovating or only considering a small purchase, our experienced staff of specialists along with our sales force of nearly 200 representatives throughout the country stands ready to serve you.

RITTER CO., INC. — Booth 27

We invite you to see Ritter and Liebel-Flarsheim medical equipment, including Ritter Motor Hydraulically Elevated "Multi-Level" Examination and Treatment Tables, L-F Diathermy Units and the L-F BasalMeteR, Self-Calculating, basal metabolism apparatus. Competent representatives will be on hand to demonstrate the equipment and show you just how it can help you in your daily practice.

SARATOGA SPRINGS AUTHORITY — Booth 18

How the New York State-owned Saratoga Spa serves the physician and the patient is completely explained in this new exhibit. Changing cards tell the story of mineral baths and other types of treatments with naturally carbonated mineral water and the Saratoga Spa's year round recreational activities. A booth attendant will take registrations and dispense information and literature. (Member of the Association of American Spas)

TECA CORP. — Booth 42

See Teca for the latest in electrodiagnosis and electrotherapy. Low volt generators, chronaxie meters and Teca electromyograph with new photo recording and conduction

time testing features will be in operation. Bring your questions.

TENENBAUM PROSTHETICS — Booth 30

As originators of the cosmetic hand and glove concept, this firm pioneered innovations which others have followed. Their exhibit will feature cosmetic prostheses which may be considered functional where truly normal appearance is required. The hands have ductile fingers which can hold objects without the use of a mechanical harness.

THERMO-ELECTRIC CO. — Booth 32

Thermo-Electric Company will display the Dickson Paraffin Baths which were pioneered and developed in cooperation with Cleveland Hospitals where they have been in continuous use for the past 18 years. Noteworthy features are the mahogany mouldings designed for the comfort of the patient; double control of the melting element insuring maximum safety; and improved patented drain. Several models will be shown.

TRU-EZE MFG. CO., INC. — Booth 15

EXTRA HANDS FOR YOU!! . . . A demonstration will show the ease of administering intermittent traction and the versatility of the TRACTOMATIC, portable intermittent traction machine. Simple operating technic permits simultaneous treatment of other patients. Cool running, rugged construction, precision built, economically priced with 100 lbs. of traction pull. Smooth, gentle and firm vertical or horizontal traction provided from any angle, height or position.

THE WHITEHALL ELECTRO MEDICAL CO., INC. — Booth 3

Visit our booth for a demonstration of the Whitehall "one motor" mobile whirlpool bath — the whirlpool combining all essential operations into a **single** motor driven system. We would also like to discuss with you any particular requirements you may have for hydrotherapy equipment. A complete range of Whitehall Hydrotherapy Equipment is available including wading tanks and therapeutic pools.

WYETH LABORATORIES — Booth 14

Wyeth will feature EQUANIL® (Meprobamate, Wyeth) the unique antianxiety factor with marked muscle-relaxant properties, for treatment of tense and anxious patients as seen in general practice; also valuable as a relaxant for musculoskeletal and neuromuscular disorders. ZACTIRIN,* containing ethoheptazine citrate, a new Wyeth-developed compound, and acetylsalicylic acid. ZACTIRIN is an effective, well-tolerated, non-narcotic analgesic for the relief of musculoskeletal pain; low back pain; pain of bursitis, synovitis and related rheumatic conditions; minor traumatic pain; subacute postoperative pain, postpartum pain, abdominal or perineal; pain secondary to dental infections and dental surgical procedures. (*Trademark)

we meet . . .

in philadelphia . . .

in 1958 . . .

36th Annual Session, American Congress of Physical Medicine and Rehabilitation, Philadelphia, Hotel Bellevue Stratford, August 24-29, 1958.

Specialists in Electro Medical Equipment for Physical Therapy, Rehabilitation and Diagnosis

ELCO

FRED LANDAUER CO.

11 BLENHEIM COURT
ROCKVILLE CENTRE, L. I., NEW YORK
Tel. RO 6-4527

THA

REPRESENTING LEADING MANUFACTURERS

Dependable Repair Service

Liberal Trade-Ins

Consultant Service for planning new departments

We buy and sell Good Used Equipment

Members

Standing Committees of the

American Congress of Physical Medicine and Rehabilitation

1958

Advances in Education
Arthur S. Abramson, *Chairman*
Robert W. Boyle
Harriet E. Gillette
Harold N. Neu
Elias M. Throne

Awards for Scientific Exhibits
David M. Paul, *Chairman*
John H. Kuitert
David S. Rausten
Joseph B. Rogoff
Abraham Vinograd

Balneology and Health Resorts
Igho H. Kornbluch, *Chairman*
E. C. Christensen
Boris J. Paul
Edward P. Reese

Braces, Splints and Prostheses
Odon F. von Werssowetz, *Chairman*
Leonard F. Bender
William J. Erdman, II
Edward T. Haslam
W. Kenneth Lane
Frederick E. Vultee, Jr.
Jessie Wright

Chronically Ill and Aged
Joseph N. Schaeffer, *Chairman*
Joseph F. Dreier
Bruce B. Grynbaum
Max K. Newman
Samuel Sherman
Earl J. Wylie
Frederick Ziman

Constitution and By-Laws
Richard T. Smith, *Chairman*
Earl C. Elkins
John H. Kuitert

Cooperation with Air Force, Army, Navy, Public Health and Veterans Administration
Robert V. Miller, Jr., *Chairman*
W. Harvey Moore
Anton A. Tratar
A.B.C. Knudson, *Ex-officio*

Cooperation with Food and Drug Administration
Joseph B. Rogoff, *Chairman*
Thomas P. Anderson
Donald J. Erickson
Rex O. McMorris
Fred B. Moor
James W. Rae, Jr.
David Rubin
Frederick J. Sheffield
George C. Twombly, Jr.

Correlation of Physical Medicine and Psychiatry
Daniel Dancik, *Chairman*
Allen W. Byrnes
C. DeWitt Dawson
Lucile M. Eising
Anita M. Isaac
H. Frazer Parry
William C. Schaefer

Essay Award
(ACPM&R Annual Essay Award and Bernard M. Baruch Essay Award)
George D. Williams, *Chairman*
Fritz Friedland
Frederic T. Jung
Israel Muss
Abraham Vinograd

Ethics
Harold B. Luscombe, *Chairman*
Louis P. Britt
Maxwell D. Flank
George H. Koepke
Robert M. Krout

Finance
Sedgwick Mead
Louis B. Newman
Herbert W. Park
Frank H. Krusen, *Ex-officio*

Foster, Encourage and Coordinate Research Projects
Joseph Goodgold, *Chairman*
David I. Abramson
Harvey E. Billig, Jr.
Ralph E. DeForest
Bror S. Troedsson

Gold Key Award
Frederic J. Kottke, *Chairman*
Donald A. Covalt
Donald J. Erickson
Louis B. Newman
Jerome S. Tobis

Implementation of Departments of Physical Medicine and Rehabilitation in Medical Schools
E. C. Christensen, *Chairman*
Arthur S. Abramson
Gregory Bard
Justus F. Lehmann

Legislation
Glenn Gullickson, Jr., *Chairman*
Earl C. Elkins
William C. Fleming
Bruce B. Grynbaum
Alfons J. Muller
Raoul C. Psaki
Vann S. Taylor
Dorothea C. Augustin, *Ex-officio*
F. Manley Brist, *Ex-officio*

Medical Auxiliary Services Related to Physical Medicine and Rehabilitation
Herbert W. Park, *Chairman*
Nadene Coyne
Emily R. Hess
Robert M. Krout

Medical Economics
Leonard J. Yamshon, *Chairman*
Bertram M. Bernstein
Joseph E. Cox
S. Malvern Dorinson
Edward M. Krusen
William J. La Joie
Joseph Martella
Robert V. Miller, Jr.
Arthur A. Rodriquez
Frederick J. Sheffield
Bror S. Troedsson

Meeting Place

Walter J. Zeiter, *Chairman*
Morton Hoberman
Torsten H. Lundstrom
Eugene W. Peters
Howard F. Polley
Dorothea C. Augustin, *Ex-officio*

Membership

Otto Eisert, *Chairman*
Hilda B. Case
Carrie E. Chapman
Robert F. Dow
Elmer J. Elias
Gustave Gingras
Sherburne W. Heath, Jr.
Herbert Kent
Torsten H. Lundstrom
Richard R. Owen

Memorials and Lectureships

Frederic T. Jung, *Chairman*
Jerome S. Tobis
Walter J. Treanor

Nominating

A.B.C. Knudson, *Chairman*
Donald A. Covalt
Harriet E. Gillette
Gordon M. Martin
Fred B. Moor

Private Practice

David Siegel, *Chairman*
Lee B. Greene
Joseph L. Koczur
Samuel A. Schuyler

Program

Glenn Gullickson, Jr., *Chairman*
Leonard F. Bender
Harvey E. Billig, Jr.
Everill W. Fowlks
Morton Hoberman
Harold Lefkoe
Milton Lowenthal
Walter J. Zeiter
Dorothea C. Augustin, *Ex-officio*

Public Relations

Ralph E. Worden, *Chairman*
Harold Dinken
Charles D. Shields

Rehabilitation Centers

Edward B. Shires, *Chairman*
Herman J. Flax
Gustave Gingras
O. Leonard Huddleston
Keith C. Keeler
Kenneth S. Landauer
Rex O. McMorris
Harry W. Mims
Herbert W. Park
H. Frazier Parry
Juan Jose Quezada
Odon F. von Werssowetz
Ralph E. Worden

REGIONAL OFFICERS
AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

EASTERN SECTION — Chairman, Elmer J. Elias, Trenton 9, N. J.; Secretary, Isadore Levin, 1801 Eye St., N.W., Washington 6, D. C.

States represented: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and (District of Columbia).

MIDWESTERN SECTION — Chairman, Robert W. Boyle, Milwaukee; Secretary, Adeline B. Gauger, 1121 N. Waverly Pl., Milwaukee 2.

States represented: Colorado, Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin and Wyoming.

WESTERN SECTION — Chairman, David Rubin, Los Angeles; Secretary, Robert V. Miller, 133 S. Lasky Dr., Beverly Hills, Calif.

States represented: Arizona, California, Utah, and Territory of Hawaii.

NORTHWESTERN SECTION—Chairman, Harold E. Elger, Vancouver, Wash.; Secretary, Everill W. Fowlks, Chief, Physical Medicine and Rehabilitation Service, VA Hospital, Portland.

States represented: Idaho, Montana, Oregon, and Washington.

CENTRAL SECTION — Chairman, Keith C. Keeler, Akron, Ohio; Secretary, Hilda B. Case, Department of Physical Medicine and Rehabilitation, University Hospital, Cleveland.

States represented: Indiana, Kentucky, Michigan, Ohio, Virginia and West Virginia.

SOUTHERN SECTION — Chairman, Torsten H. Lundstrom, Mountain Home, Tenn.; Secretary, Harry W. Mims, Director, Physical Medicine and Rehabilitation, Medical College Hospital, Medical College of South Carolina, 55 Doughty St., Charleston, S. C.

States represented: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee and Texas.

HELP US KEEP THE THINGS WORTH KEEPING

Speech is free in America. But it's not free for the *keeping!* Protecting our American heritages costs money.

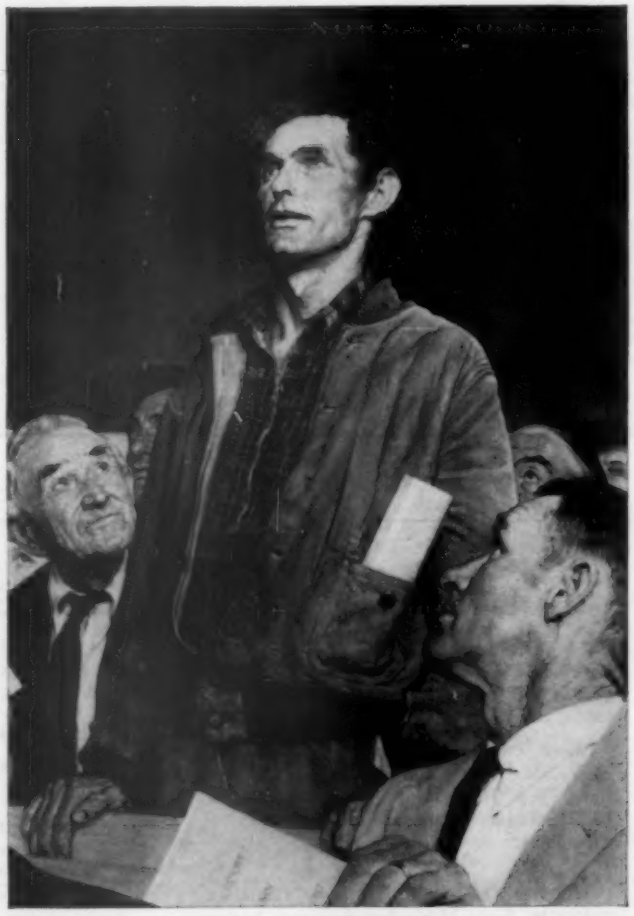
It takes money for strength to keep the peace. Money for science and education to help make peace lasting. And money saved by individuals.

Your Savings Bonds, as a direct investment in your country, make you a Partner in strengthening America's Peace Power—helping us keep the things worth keeping.

Good cash investment, too. Put 3 dollars into Series E Bonds — take out 4 in just 8 years, 11 months.

Safe. Both interest and principal guaranteed by the U. S. Government. Every Bond *recorded*, so if it's lost, stolen or destroyed it can be replaced, free.

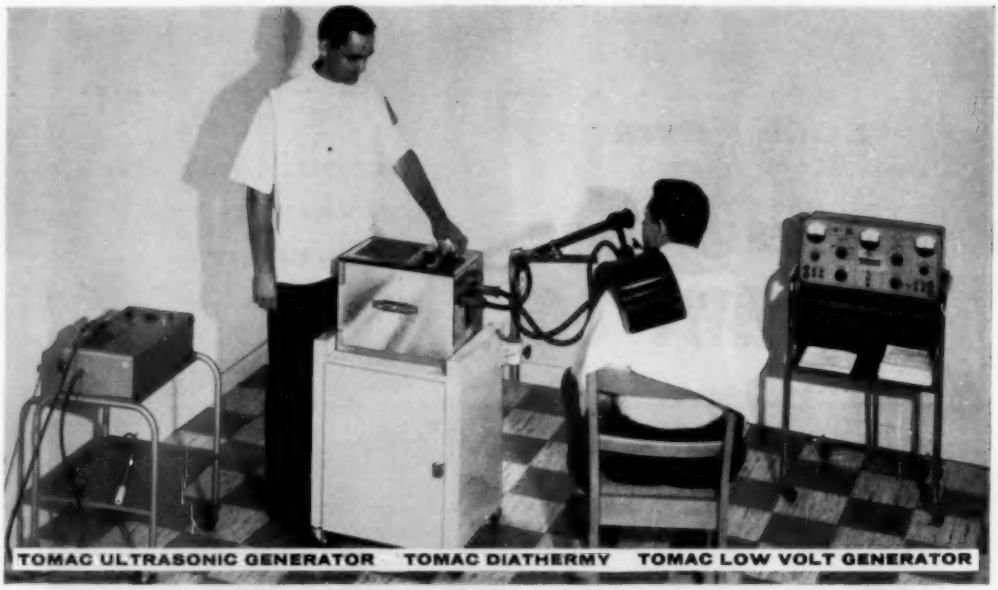
Automatic saving. The Payroll Savings Plan is the *automatic* way to save for the big things in life.



HELP STRENGTHEN AMERICA'S PEACE POWER

BUY U. S. SAVINGS BONDS

The U.S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, The Advertising Council and this magazine.



TOMAC ULTRASONIC GENERATOR TOMAC DIATHERMY TOMAC LOW VOLT GENERATOR

R/P...your best source for ALL electro-medical equipment

R/P provides the physician and therapist not only with the most advanced and complete electro-medical instruments, but also the advantages of single-source purchasing. In addition to the exclusive Tomac Electrotherapy equipment illustrated, R/P, as a national distributor of major lines, offers all types of diagnostic and therapeutic equipment for limitless treatment potential.

• NEW TOMAC STANDARD DIATHERMY UNIT

All applications of medical diathermy are possible with this new compact unit—convenient, adjustable induction electrode, inductance cable, air-spaced condenser, cuff, pad, sinus mask and other electrode designs. Easy-to-read controls are permanently marked. All power tubes are specially designed for exceptional durability. Unit meets all FCC requirements. Tan deluxe cabinet. 120 volts, AC. Guaranteed one year.

No. 1565A—Each $688.00*

• TOMAC PORTABLE ULTRASONIC GENERATOR

This 28 lb. unit is so conveniently portable and compact it may be carried from patient to patient. It may be hung on the wall or used with No. 1701 Tomac Cart for greater mobility. The Tomac Ultrasonic Generator is available with straight or angulated hermetically sealed treatment heads. Underwater treatment accessories (No. 1702) include a 90° deflector with 2 suction cups and transducer holding handle.

No. 1707—Including wall bracket:
with angulated sound head...$385.00*
with straight sound head.....375.00*

No. 1702—Underwater treatment accessories.....21.00*

• TOMAC MOBILE LOW VOLT GENERATOR

This low volt therapeutic generator provides current for: comfortable stimulation of normal nerves and muscles, effective muscle stimulation with denervation present, ion transfer therapy, muscle and nerve testing and medical galvanism. The unit has two generating sections, separate circuits for AC stimulation and DC therapy that may be used simultaneously. Unit has eleven calibrated frequencies. There are individual meters for AC and DC circuits, separate test terminals and switch with easy-to-operate control panel.

No. 1721—Each.....$465.00*
No. 1722—Stand, each.....35.00*

***Less 10%**
institutional discount

For complete information on this electrotherapy equipment, consult your Rehabilitation Products representative or write our regional office nearest you.

The Place To Go For The Names You Know

Rehabilitation Products

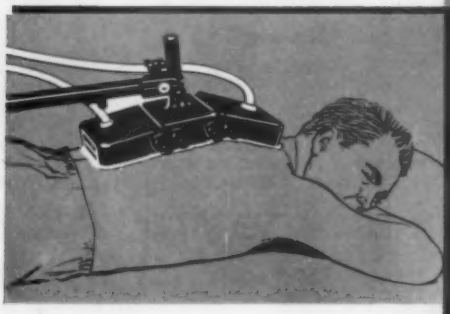
A Division of American Hospital Supply Corporation, 2020 Ridge Ave., Evanston 22, Illinois.

Regional Sales and Distribution Centers

ATLANTA • Chamblee, Ga.
CHICAGO • Evanston, Ill.
COLUMBUS • Columbus 6, Ohio
DALLAS • Dallas 19, Texas
KANSAS CITY • N. Kansas City 16, Mo.
LOS ANGELES • Burbank, Calif.
MINNEAPOLIS • Minneapolis 12, Minn.
NEW YORK • Flushing 58, N.Y.
SAN FRANCISCO • South San Francisco, Calif.
WASHINGTON • Washington 18, D.C.

FULL POWER ALLOWS DEEP HEATING

BURDICK MF-49 UNIVERSAL DIATHERMY

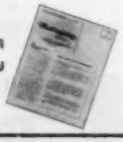


Full-power tube output of the MF-49 allows deep heating and large-area treatment when needed. The high output in relation to input is obtained by a separate tube circuit that controls frequency. This circuit remains unaffected by the patient circuit.

The MF-49 is adaptable to every technic. It can be used with contour applicator, air-spaced electrodes, induction cable, cuffs and pads, internal electrodes, and for minor electrosurgery.

It has been listed for safety by the Underwriters' Laboratories, and for non-interference by the F.C.C.

The Burdick Syllabus, a bulletin on physical medicine, will be sent you on request.



Burdick

THE BURDICK CORPORATION
MILTON, WISCONSIN
Branch Offices:
NEW YORK • CHICAGO • ATLANTA • LOS ANGELES
Dealers in all principal cities

NEW for '58

Dallons FUTURA* Line

* ADVANCED ENGINEERING * ADVANCED DESIGN

IN ULTRASONICS . . . . Dallons BUILDS THE BEST

And here's just one proof! **It's the all-new Portable Model 1200**

1958 FEATURES
- 3 COMPLETELY NEW STYLINGS
- 3 CRYSTAL SIZES 7 — 10 — 12.5 sq. cm.
- 3 NEW LOW PRICES. $395. $495. $695.

Approved UL FCC

Model 1200
ACTUAL CRYSTAL SIZE
7 sq. cm.
$395.

Model 1100
ACTUAL CRYSTAL SIZE
10. sq. cm.
$495.

Model 1000
ACTUAL CRYSTAL SIZE
12.5 sq. cm.
$695.

Dallons
all-new 1958 FUTURA LINE

It is truly physical medicine equipment at its unsurpassed best. Never before has there been better engineering, finer appearance, at lower prices . . . We invite your careful inspection and comparison. You will quickly see why doctors everywhere are acclaiming Dallons Futura line *the best!*

WRITE TODAY FOR NEW 1958 FUTURA LINE CATALOG.

made only by **DALLONS LABORATORIES, INC.**

1ST IN ULTRASONICS

5066 SANTA MONICA BLVD., LOS ANGELES 29, CALIFORNIA

Designed and Manufactured with Integrity

by Birtcher

ULTRASONICS

EXCLUSIVE 5 POSITION TRANSDUCER

For instant adjustment to the most comfortable and effective angle for treatment.

ELECTRO-SURGICAL UNITS

MEGASON V

A handsome console model designed for the physician who accepts only the finest.

MEGASON VI Table Model

Full 15 watt output heavy duty circuit in a compact, lightweight table unit.

HYFRECATOR

More than 125,000 in use internationally for removal of superficial skin growths.

799-H "Hospital" Model

Provides a flexible surgical current for every technic with ample reserve power.

MEGASON X

A powerful and rugged table model with all of the "big" unit features plus portability.

MEGASON VI Portable

Full power, full output, yet weighs less than 25 pounds including storage lid.

BLENDTOME

Ideal for office electro-surgery in cervix conizations, proctological work, etc.

2000 "Personally Certified"

Aptly called the "Rolls-Royce" of surgical units — the finest on the market.

SHORT WAVE DIATHERMY

BANDMASTER

Recognized as a standard of quality, this handsome console unit is used in every school of Physical Medicine recognized by the A.M.A. as well as by Army, Navy, and leading civilian hospitals.

CRUSADER

The only short wave diathermy in the lower price range equipped for the large technic. The Crusader gives consistently excellent performance regardless of climate, elevation or temperature changes.

CARDIOLOGICAL EQUIPMENT

ELECTROCARDIOGRAPH

The only portable ECG machine made with laboratory quality and refinements.

HEARTPACER

To take over the function of the cardiac pacemaker under emergency conditions.

DEFIBRILLATOR

Provides a controlled and timed electric shock to stop ventricular fibrillation.

CARDIOSCOPE

For use with an ECG or by itself to observe cardiac functions visually and audibly.

LIGHT THERAPY

SPOT-QUARTZ ULTRAVIOLET

An ultraviolet spot light for localized germicidal radiation and diagnosis.

GOLDEN GLOW HEAT LAMPS

Three models of infrared lamps to provide maximum operating safety and convenience.

MUSCLE STIMULATOR

MYOSYNCHRON

3 forms of non-irritating exponential currents for electro-muscle activation.

HYDROTHERAPY

VIBRA-BATH

Millions of tiny warm air bubbles to gently or vigorously massage any body area.

Just send me a postcard and I'll send you loads of printed matter on any of the above subjects.

When you buy equipment — make sure it's
BIRTCHER-BUILT

Cordially,

Cecil Birtcher

C. J. BIRTCHER, *President*
The Birtcher Corporation

Birtcher — **HONEST VALUE . . . SINCERELY PRESENTED**
4371 Valley Boulevard, Los Angeles 32, California